Eric Baker

The Monthly Review of the AMERICAN ELECTROPLATERS' SOCIETY

CONTENTS

Editorial 173

Anderson and Reinhard—Alkaline Cleaning and Copper Blistering 175

Tracy—A Discussion of the Common Complex Metal Cyanides in Cyanide Plating Solutions 195

Harper—Ventilation and Automatic Buffing 184

Here and There 191, 202

Branch News 206

Index to Advertisers 232

Membership Report 236

Buyers' Guide 240

Branch Directory 244

MARCH 1940

℞

The Doctor's Prescription for

SMUT-ITIS

IS THE

Cathanodic

TRADE MARK

CLEANING PROCESS

THIS PROCESS WILL POSITIVELY REMOVE ALL SMUTS AND BUFFING COMPOUNDS FROM FERROUS & NON-FERROUS METALS

FREDERICK GUMM CHEMICAL CO.
INCORPORATED
538 Forest St., Kearny, N. J.

Western Distributor
BELKE MFG. CO., 947 N. Cicero Ave.
Chicago, Ill.

The Monthly Review

Published by the AMERICAN ELECTROPLATERS' SOCIETY, Inc.

A Society for the Advancement of the Science of Electroplating

MARCH 1940

W. J. R. KENNEDY
Editor

W. W. McCORD
Associate Editor

SUBSCRIPTION $3.00 A YEAR

Entered as second class matter at the Post Office at Springfield, Mass., September 8, 1930, under Act of August 24, 1912.

Acceptance for mailing at special rate of postage, provided for in section 1103, Act of February 28, 1925, authorized September 3, 1926.

Today's Demands for Efficiency and Economy Are Being Met with . . .

MEAKER

PLATING EQUIPMENT

●

★**MEAKER FULL AUTOMATICS**

Plating and
Processing
Machines
of All Types

★**MEAKER VARIABLE SPEED PLATING MACHINES**

★**MEAKER-ELECTRIC PRODUCTS GENERATORS**

Every piece of Meaker equipment is backed by over 38 years of hard-pan operating experience and practical engineering accomplishment.

●

THE MEAKER COMPANY

1629-41 S. 55th Avenue (Cicero Station), Chicago, Ill.

The Monthly Review

Published by the
AMERICAN ELECTROPLATERS' SOCIETY, INC.

Publication and Editorial Office
93 Oak Grove Ave.
Springfield, Massachusetts

VOL. XXVII MARCH 1940 NO. 3

Editorial

We have been struck by the prevalence of the conviction, evidenced both in correspondence and conversation during the past year, that there has been an actual decrease in the total amount of plating, occasioned by inroads of lacquers, plastics and alloys.

That these other types of finishes constitute a potential threat is undoubtedly true but we are by no means sure that, in spite of them, there is any real decrease in the total amount of plating.

Such standard fields as jewelry, silverware of all characters, and plumbers' goods, while they would vary from year to year according to general business conditions and changes in standard of living, would seem likely to increase roughly in proportion to the increase in population.

The adoption of plated finishes by the automobile undoubtedly cause the greatest individual increase in plating. The automobile changes location of plate, and to some degree character of plate, from year to year but we doubt that accurate measurement would disclose any less plating in the aggregate in that field than ten years ago.

In addition there has been a host of small articles such as electrical appliances and drugstore goods which have adopted plated finishes in whole or in part during the past ten years.

Certainly we have lost in individual cases to these other types of finishes, but it is a long step from that to be sure that we have decreased in the sum total.

We can readily understand that a firm producing special equipment such as generators, full automatics, even plating tanks or polishing lathes, might easily make a dollar comparison in their own business and come to the conclusion that there is less plating, while as a matter of fact every plant to which they contributed might be running full blast and also a lot in which they had no part, but there is not yet need of replacement equipment. It does not necessarily follow that there is less plating because demand for special equipment may be less at the present time than at some other period.

This brings us to our point. Neither we nor anyone else knows

with any degree of certainty just how the sum aggregate of plating at the present compares with the total of any other period. We have to guess, and in most industries of like importance no guessing is necessary. The figures are provided with accuracy.

It could be done with plating. It we knew quarterly or monthly just how much tonnage had been sold in silver, copper, nickel, zinc and cadmium anodes, we would have a pretty good conception of just what the industry is actually doing. There is some lag between sale of anodes by producers and eventual consumption, but it would pretty closely reflect actual operations.

Some of the old-timers will probably remember Gus Creuz and his story of the early days when he went into a plant and the manager told him that he had the best plater in America. Always before this fellow showed up they had been compelled to buy anodes all the time but since he had been there, they had not bought any. Gus suggested that so far he had never discovered any way to send metal out the shipping-room door without bringing it in the receiving room, and he would recommend that they make a comparison of their bills for metal salts before and after taking. Soon after that the plater departed for parts unknown. However we do not think there are many of that type of plater still holding down jobs in the industry and that if we knew the total of anodes bought, we would be reasonably close to the figure for operations.

Whether this information is of sufficient advantage to the members of the industry to offset the work necessary to make it available, we do not know. If it is to be done at all, it should go out with the authority of the Society. It would entail cooperation on the part of all producers and faith in our integrity that information given us would be used only toward compiling totals and not be divulged in any other way. The figures would not be worth anything unless everyone was willing to play ball. We have not discussed it and have no means of knowing whether or not they would fall in line.

It would require additional work on our part and we have plenty to do, thank you, and are not anxious to take on any more unless by so doing, we are really going to help the industry.

It would appear to us that job-platers, supply-houses, makers of equipment, makers of supplies, and even the producers of anodes would be in better position to make plans and control operations, if they knew accurately what the industry as a whole was doing.

However, they may not be interested, or care, and in that case there is no particular object in our doing it.

We would welcome discussion on the subject both pro and con, but from a personal angle it rather sticks in our craw that an industry as important as that of electroplating has to guess and does not really know what it is doing.

Alkaline Cleaning *and* Copper Blistering

By E. A. ANDERSON[1] and C. E. REINHARD[1]

PLATING is an art complicated by many problems, one of the most interesting from a laboratory viewpoint and exasperating from an operating viewpoint being the development of blisters in copper electrodeposits on zinc.

During the past year the writers have obtained micrographic evidence of a direct relation between overcleaning and copper blistering which has been of considerable assistance in largely eliminating this problem in several commercial plants. It is in the hope that the principles involved will be of help to other plants that this article is written.

At the present time, practically all of the large tonnage of zinc alloy die castings being plated annually in this country is given a primary coating of copper about 0.0002-0.0003" in thickness applied from a cyanide copper solution. After subsequent nickel and chromium plating, many of the pieces are coated in part with organic finishes which require baking at temperatures up to and, in a few cases, above 300° F. to insure good adhesion of the finish to the chromium surface.

At times, blisters varying in size and distribution are found in the plated coatings after the baking treatment. More rarely, but still fairly often, these blisters develop in the plate during simple standing at room temperature or even during the act of plating. This type of blister is characterized by the fact that, when lifted, the under side of the coating is gray instead of the red copper color one would normally expect to see. This observation has led many to believe, erroneously, that the plate has pulled some of the zinc surface with it and to assume that the casting is faulty.

* * *

It is readily apparent that two requirements must be met before a blister can develop. A force must exist tending to lift the plate and a weak spot must be present in the bond which is not capable

[1]Metal Section, Research Division, The New Jersey Zinc Company, Palmerton, Penn.

of resisting this force. This article does not consider the origin or nature of the lifting force but merely recognizes its part in the blistering phenomenon. The location of the separation of the plate and the factors controlling the presence or absence of weakness in this area constitute the whole subject of the discussion.

From the very beginning, routine micrographic examination of commercial samples has revealed the presence in many of them of the zone of diffusion between the copper and the zinc base discussed by Castell[2] and others. What was of greatest interest was the variation in the thickness of this diffusion zone noted in samples from various manufacturers. Typical structures appear in Figures 1 to 4, inclusive.

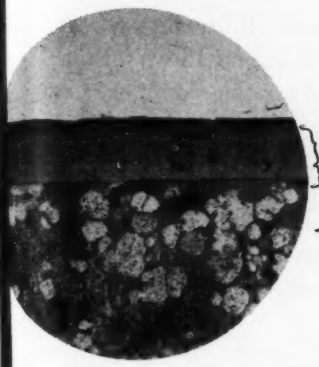
Furthermore, substantial differences were noted in the extent of diffusion on buffed and unbuffed (before plating) surfaces on the same plated part. A typical example is shown in Figures 5 and 6.

A few years ago, when the presence of zones of diffusion between copper deposits and zinc die castings was regarded as an interesting novelty, studies were made of such areas in this laboratory. The results showed conclusively that such a diffusion zone contains amounts detectable by X-ray diffraction methods of all of the phases of the zinc-copper system that are stable at room temperature. Included in these are two zinc-rich white alloys, epsilon and gamma, which are distinguished chiefly by their great brittleness. It was expected at that time that these brittle alloys would sometime be a source of trouble with copper plated zinc but no active efforts to connect blistering with diffusion were made by the writers until the present.

In the examination of blistered commercial platings several microsections were made which intersected actual blisters. The microstructure in these areas revealed clearly that the blister had formed by separation of the plate within the zone of diffusion (see Figures 7 and 8).

The fact that separation occurs in the diffusion zone has been confirmed in at least two cases by electron diffraction examination of the gray material on the back of blistered platings and of the surface of the casting below the blister. In both cases the diffraction patterns showed that these surfaces consisted of a combi-

[2]Wilhelm Castell—"Diffusion in Copper Plated Zinc Base Die Castings," Proc. A.E.S. V. 22, 1934.



ure 1. 1000X No visible diffusion

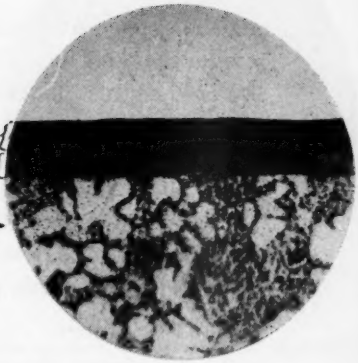
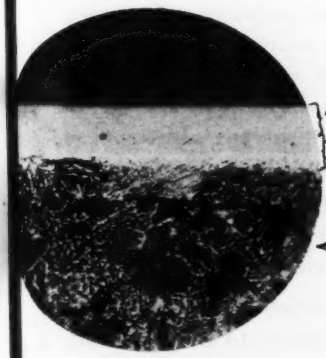
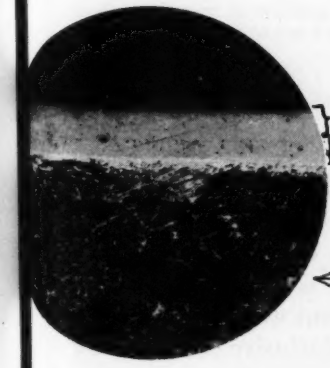


Figure 2. 1000X No visible diffusion



ure 3. 500X Thin diffusion layer

Figure 4. 1000X Heavy diffusion layer



5. 500X Buffed side—thin diffusion layer

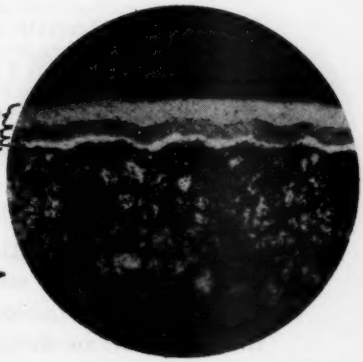


Figure 6. 500X Unbuffed side—heavier diffusion layer

nation of the brittle epsilon and gamma phases. In the face of this evidence one is forced to believe that these diffusion alloys form a favored source of weakness in copper-nickel coatings on zinc.

There are then two factors which point to a possible way of controlling this problem of copper blistering: (1) the point of failure is in the diffusion zone and (2) the presence or absence of the diffusion zone varies with different commercial plating practices. Could it be possible to control the extent of diffusion by the selection of desirable plating procedures a distinct forward step would be taken.

In examining the situation there appeared to be only three general points of attack: (1) the casting, (2) the buffing, and (3) the cleaning prior to plating. The fact that, in many instances, a wide range of blistering trouble has been experienced among several platers all using castings from one source would seem to rule out possible variations in the castings as a major source of trouble. Buffing practice did not seem to vary sufficiently from plant to plant to contribute directly to the problem. In the case of cleaning, however, a definite background of preliminary information existed. C. E. Heussner, for example, had reported[3] definite improvements with regard to blistering resulting from reductions in the duration of the alkaline cleaning cycle.

In order to investigate this factor a series of test bars of A.S.T.M. Alloys XXI and XXIII was subjected to the following preparation cycle:

Buffed with tripoli
Cleaned cathodically in hot 6-ounce per gallon solution of trisodium phosphate for 1/2 minute, 1 minute, 2 minutes, and 5 minutes
Rinsed in hot then in cold water
Dipped 5 seconds in 5 per cent by volume HCl
Rinsed—copper plated in a simple copper cyanide solution. The bars were later nickel and chromium plated

The only intentional variable in these tests was the time of alkaline cleaning. Due to circumstances beyond our control, microexamination of these specimens was delayed several months with the result that the thicknesses of the diffusion layers were probably increased somewhat although it is probable that the relative order of thickness between specimens was unaltered. In the microsections shown in Figures 9 to 20 inclusive it will clearly

[3]Private communication.

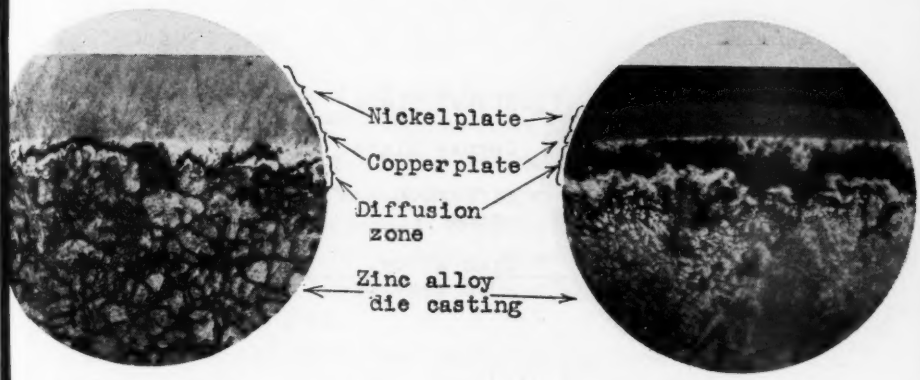
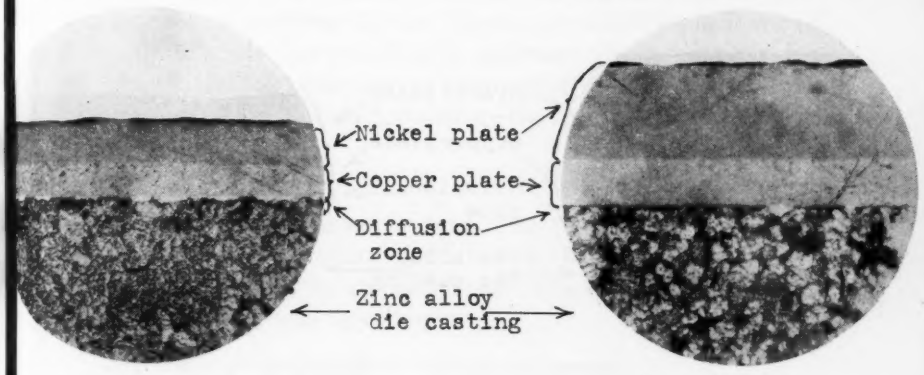


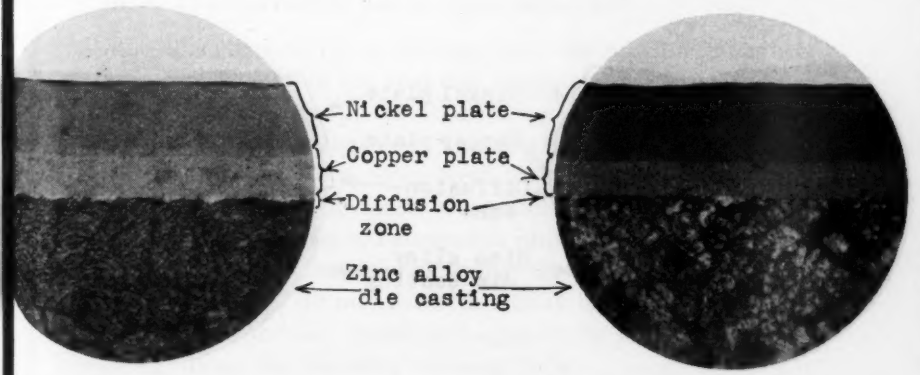
Figure 7. 1000X
rack extending through diffusion zone

Figure 8. 1000X
Note diffusion product in both sides of separation



igure 9. Alloy XXI Buffed before plating
Cleaned 1/2 minute
lote thin discontinuous diffusion 1000X

Figure 10. Alloy XXIII Buffed before plating
Cleaned 1/2 minute
Note small spots of diffusion 1000X



igure 11. Alloy XXI Buffed before plating
Cleaned 1 minute
te thin discontinuous diffusion layer 1000X

Figure 12. Alloy XXIII Buffed before plating
Cleaned 1 minute
Note thin spotty diffusion layer 1000X

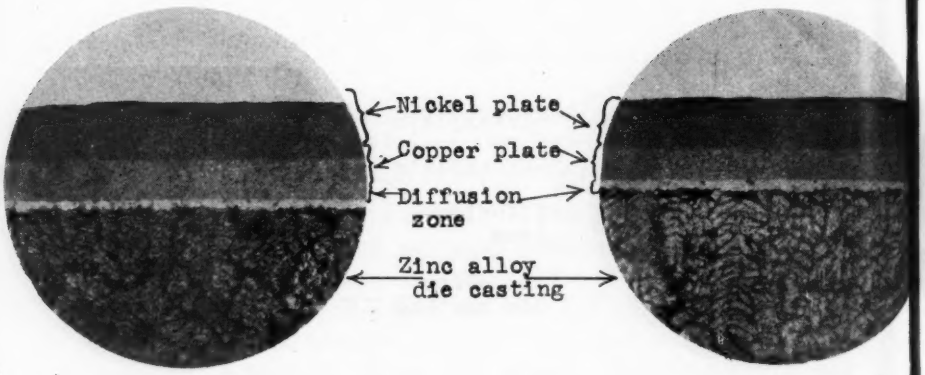


Figure 13. Alloy XXI Buffed before plating
Cleaned 2 minutes
Note heavier diffusion layer 1000X

Figure 14. Alloy XXIII Buffed before plati
Cleaned 2 minutes
Note heavier diffusion layer 1000X

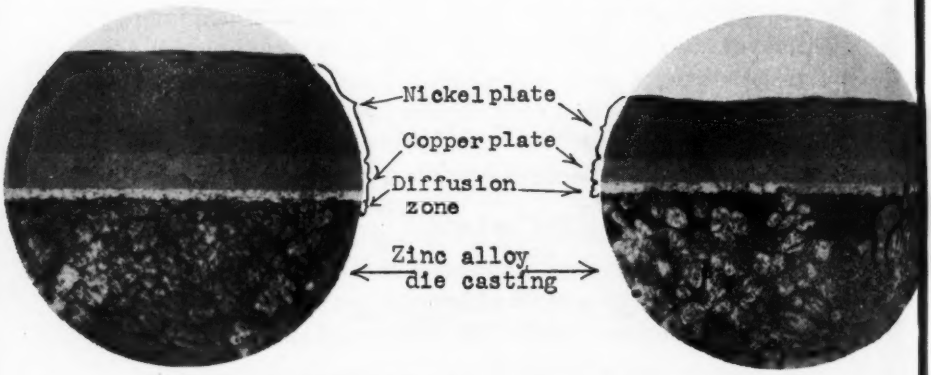


Figure 15. Alloy XXI Buffed before plating
Cleaned 5 minutes
Note heavy diffusion layer 1000X

Figure 16. Alloy XXIII Buffed before plati
Cleaned 5 minutes
Note heavy diffusion layer 1000X

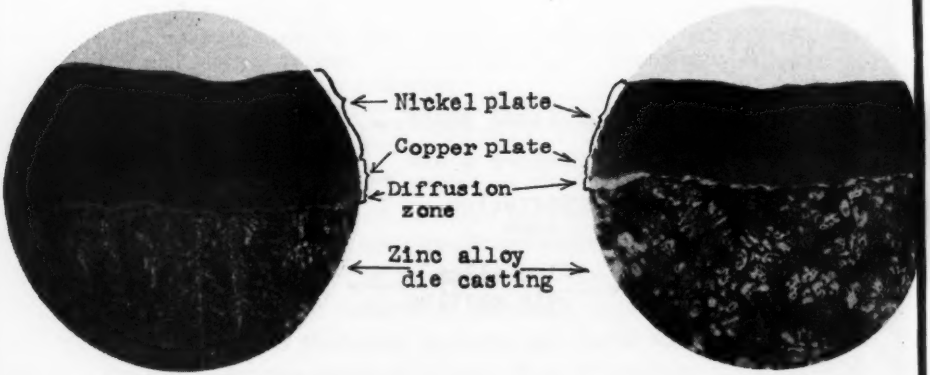


Figure 17. Alloy XXIII Not buffed before plating
Cleaned 1/2 minute
Note definite diffusion layer 1000X

Figure 18. Alloy XXIII Not buffed before pl
Cleaned 1 minute
Note definite diffusion layer 1000X

be seen that the extent of diffusion is influenced in a very definite way by the duration of the alkaline cleaning cycle.

So far no sound explanation has been developed for these interesting effects of buffing and alkaline cleaning on diffusion. The micrographs given cover tests on two alloys only. Similar experiments have been made in three other cases with closely agreeing results. Even though the explanation is missing the facts appear to be clearly established.

From all of this work the conclusion was inescapable that blistering can be controlled and that the direction in which to work is the reduction to a minimum of the contact of the zinc alloy die casting with alkaline solutions. At this time the decision was reached to postpone further laboratory activities in favor of attempts to apply this principle of minimum alkaline cleaning to the elimination of blistering in commercial production. Three such cases will, it is believed, illustrate the success with which this was done.

Case 1

This plant was experiencing about 25 per cent rejections for blistering in a daily production of about 50,000 small pieces, some buffed and some dry barrel burnished. The cleaning cycle, on a conveyor system, was as follows:

Degrease in trichlorethylene (3-stage not on conveyor)
Clean by immersion for 2 minutes in a solution containing 4 ounces per gallon of trisodium phosphate and 1/2 ounce per gallon of sodium hydroxide
Rinse
Dip for 22 seconds in 3 per cent by volume sulfuric acid

While this cleaning cycle did not, with the possible exception of the length of time in the acid dip, appear particularly drastic, attempts were made with the cooperation of F. F. Oplinger[4] to reduce the intensity of the cycle. Nothing could be done to change the times involved since these were fixed by the speed of the conveyor. Systematic decreases were made in the strength of the cleaner and the acid dip and successive improvements were noted in the per cent rejections for blistering. This plant has now been operating for nearly 10 months with a daily rejection of not over 25 to 30 pieces for any cause and apparently no rejections for blistering, using the following cleaning cycle:

[4]Electroplating Division, E. I. du Pont de Nemours & Co., Inc.

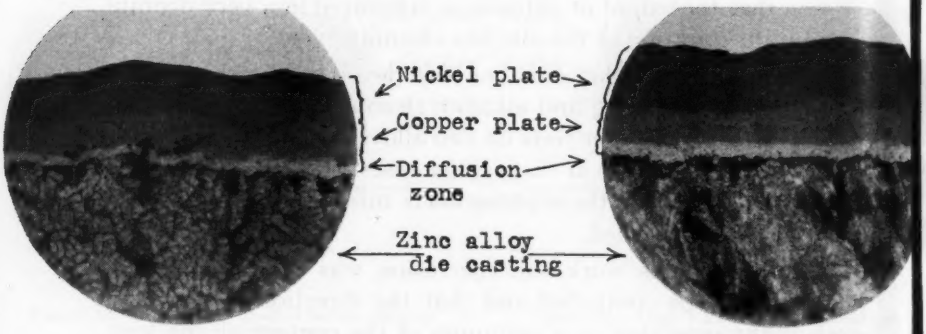


Figure 19. Alloy XXIII Not buffed before plating Cleaned 2 minutes Note heavier diffusion layer 1000X

Figure 20. Alloy XXIII Not buffed before pl Cleaned 5 minutes Note heavier diffusion layer 1000X

Degrease in trichlorethylene (3-stage)
Clean for 2 minutes by immersion in a warm solution of 10 pounds of trisodium phosphate in 520 gallons of water.
Rinse
Dip for 22 seconds in a solution of 1 1/2 gallons of commercial hydrochloric acid in 225 gallons of water

The writers do not suggest such very mild cleaning procedures for general use since success in the present case depends upon perfect degreasing which is not always accomplished. The success of the principle of minimum alkaline cleaning, however, is clearly indicated.

Case 2

This plant was plating relatively large parts, many of which were machine buffed. The following cleaning practice (conveyor system) was used:

Degrease in trichlorethylene (3-stage separate conveyor)
Clean cathodically for 1-3/4 minutes in a 2-ounce-per-gallon solution of a proprietary cleaner
Rinse
Dip for 22 seconds in a 3 per cent by volume solution of sulfuric acid

The rejections in this plant were very variable, ranging as high as 50 per cent. Experiments in which the strength of the cleaner was varied proved unsuccessful until it was found that the major source of variability lay in faulty operation of the degreasing unit. This difficulty was overcome, again with the cooperation of F. F. Oplinger, and at present the cleaning cycle used is as follows:

Degrease in trichlorethylene (3-stage)
Clean anodically for 35 seconds in a 6-ounce-per-gallon solution of a proprietary cleaner
Rinse
Dip for 35 seconds in a 1/2 per cent by volume solution of sulfuric acid

At the present time the rejections for blistering in this plant are less than one-tenth of 1 per cent.

It may be thought that the problem in this case did not lie in the alkaline cleaning step. It must be pointed out that a large reduction in cleaning time was made although the concentration of the cleaner was increased. This in turn was compensated for by the reversal in the direction of the current. It is perhaps not generally realized how much the use of current influences the effective alkalinity of a cleaner. When the work is made cathode, sodium ions are carried to the work, reacting immediately with water on giving up of their charges to form sodium hydroxide at that point.

It is not intended in raising this point to belittle the use of cathodic cleaning but merely to emphasize the need for realization of the inherent differences in this respect between it and immersion or anodic cleaning. Cathodic cleaning has been and will undoubtedly continue to be a useful procedure in the plating room.

Case 3

In this case the plant was plating medium-sized pieces, all buffed prior to plating, and was experiencing between 20 and 30 per cent rejections for blistering. The cleaning cycle (conveyor system) used was as follows:

Degrease in trichlorethylene (3-stage separate conveyor)
Clean cathodically for 45 seconds in a 2-ounce-per-gallon solution of a proprietary platers' cleaner
Rinse
Dip for 18 seconds in a dilute sulfuric acid solution

In this particular case time was not available to complete the work but the elimination of current and the use of the cleaner by immersion only produced an immediate reduction in rejections to between 1/2 and 1 per cent.

* * *

There are many other cases in which the contact was made by correspondence in which similar results were reported. It seems quite clear that the control of blistering does indeed lie in the cleaning operation and most particularly in the alkaline cleaning stage. Other factors will at times enter into the problem but their influence can usually be recognized and compensated for.

Ventilation *and* Automatic Buffing

By JOHN F. HARPER
Jackson Buff Corporation
MacFarland Mfg. Co.
Long Island City, New York

THE American Electroplaters' Society should take pride in the splendid job it is doing to arouse interest in research on the chemistry of plating. It is to be congratulated for performing the more important task of disseminating this knowledge through its meetings and the MONTHLY REVIEW. Particularly in recent years important steps have been taken to improve the eye appeal and durability of plated surfaces, and miracles have taken place on the cost sheet. The Society's part in these advances is noteworthy.

However, it must be borne in mind that the chemistry of plating must work hand in glove with the abrasive operations which produce the desired degree of smoothness and depth of color. The plating room and the buffing room are interdependent: their separate costs mean nothing, their combined costs everything. In the average finishing department the respective costs of buffing and plating are about equal. But the plating room has been subjected to intensive research for a number of years, and presumably the costs there are reaching rock bottom. On the other hand the buffing room has remained beyond the pale of research, and is virgin territory for modern methods. This article describes two important contributions which the buffing room can now make toward producing a better finish at a lower cost.

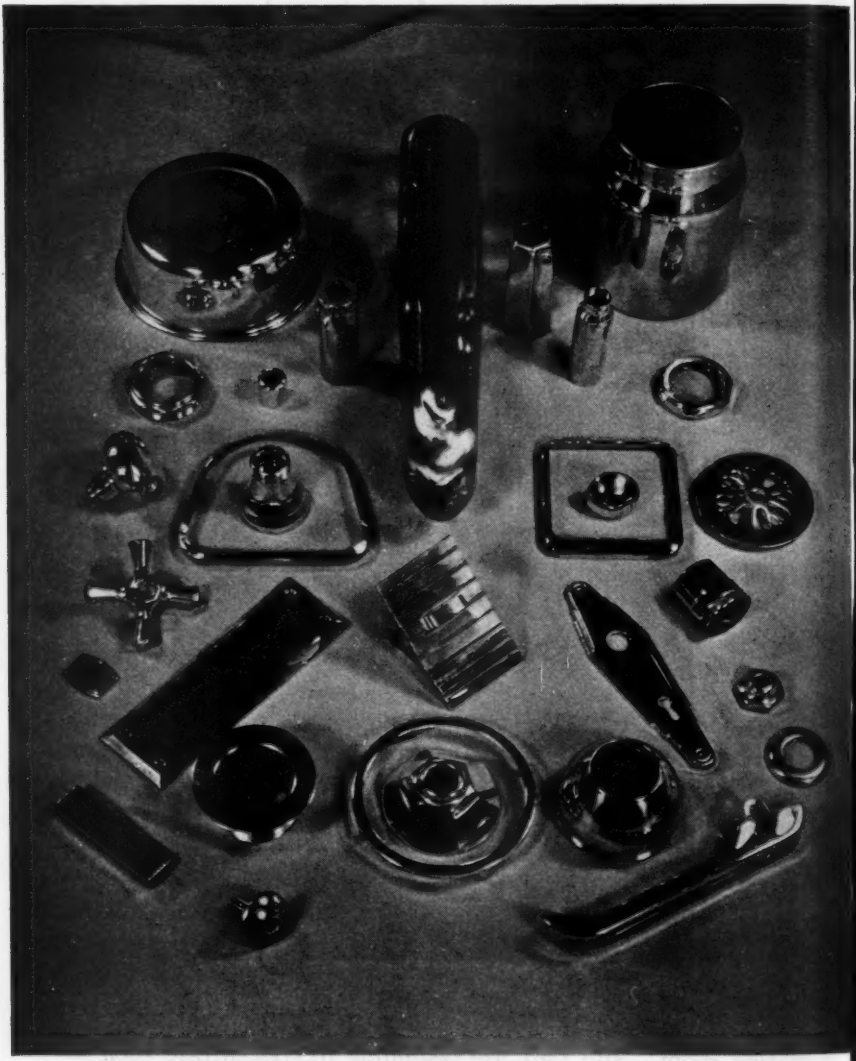
It must be admitted that until a few years ago a buff was a buff, and that one got just about what was paid for. True, there were different sheetings, sewings, and spacings commonly used. These differences depended upon the demands of the particular job. Ravel was accepted as a necessary evil. Heat was accepted as an inevitable result of abrasion. As the heat destroyed or weakened the cotton fibers, wasted composition, and reduced the cut and life of the wheel, it raised the bill for supplies and the job was slowed down. To add to the difficulty of changing any of this, buffing was considered an art to be shrouded in the deepest mystery. As in most cases of this sort what was good enough for father was good enough for son, including the mystery.

But now a growing number of people are beginning to take strenuous exception to this mystery and to the conclusion that no advances can be made in this art. They believe that long-time acceptance of this false conclusion has held back a host of improvements and maintained an inordinately high cost in the buffing room. They believe that this neglected territory will be more productive of future savings than the laboratory controlled

JOHN F. HARPER

plating room. And they are beginning to concentrate their attention there.

Two recent developments working together have done more in the past five years to advance the art of buffing, to reduce its cost, and to widen its field than all developments in the previous twenty years. They are the introduction of ventilation in buffing wheels, and the resultant improvement in the design of automatic

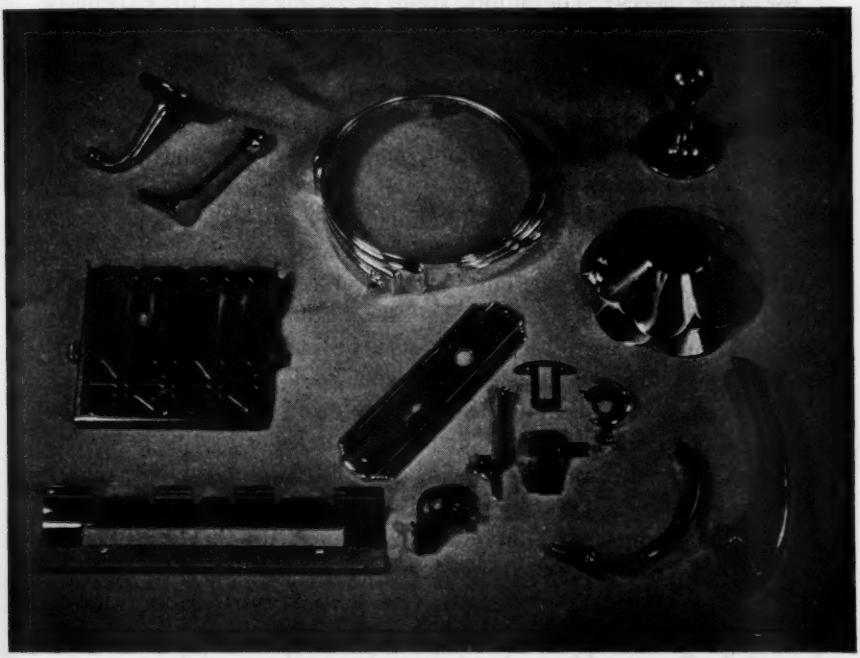


Articles buffed with Airway Buffs on Automatic Machines

buffing machines. Ventilated buffs are usually of the non-raveling type and are sold under a variety of trade names, but common usage groups them all under the term "Airway."

Ventilation in buffs opened up possibilities for automatic buff-

ing previously only hoped for. Machine efficiency depends in large degree upon reducing the inactive, or "relief" time of the buff wheels on the machine. With unventilated buffs this "relief" time is essential, because if the wheels were to be run in constant contact with the work they would lose most of their cut and life through scorching and actual burning. With ventilated buffs no "relief" time is needed, because their centrifugal flow of air



Articles buffed by hand with Airway Buffs

through the wheels cools them even under the most severe cutting-down conditions.

Ventilation having overcome the problem of wheel heat the designers of automatic buffing equipment were able to increase the effective wheel working time without increasing the number of wheels. Still not being satisfied when they had eliminated all of the "relief" time, they then designed machines with continuous wheel contact on several pieces of work. At least one well-known make of machine requires each of its three wheels to work on four

to five pieces at once . . . all the time! Figure it out for yourself: one man operating three wheels with no let-up, each wheel working continuously on at least four pieces all the time, the operator is effectively working twelve wheels 100% of the time! Is it any wonder that certain small pieces are being cut and colored in one operation by one operator at production rates of 3,000 pieces per hour? Or that rates of 2,000 pieces an hour are standard practice for larger pieces? The buffing room is ceasing to be the expensive bottleneck.

Jobs formerly regarded as strictly hand jobs are now done at about one-tenth their former labor cost by automatic machines equipped with ventilated buffs. And at the same time the buff bill has been cut in half. The selling price of automatic buffing equipment has dropped to about half its former price, because with wheel efficiency so much higher, fewer wheels are needed and smaller, better designed machines produce more than their cumbersome predecessors. Plants which could not afford their former high initial cost are now using automatic machines which are smaller but more productive. Articles never before buffed are now being given a better finish because the cost of automatic buffing is now so low. All along, the electroplating industry has gained prestige by producing a better product at lower cost.

Full automatic buffing is being used on too small a percentage of the work which is being buffed throughout the country. Each day it is getting more universal acceptance, for the trend is definitely toward more automatic equipment in the buffing field as it is in practically every other mechanical field. If ventilation has played such an important part in the development of the automatic buffing machine, what is its value to the much larger group of jobs which today are being done by hand? Will ventilation help there? And if so, to what extent?

Today the answer is emphatically "yes," and to an extent which one cannot afford to overlook. In dollars and cents, the direct savings to be had by ventilated buffs on hand work in the average plant amounts to at least one-half of the former buff bill. It must be stated here that at their first introduction ventilated buffs were much better suited to automatic buffing than they were to most hand jobs. They were first developed to do a particular automatic buffing job, and they did that well. Since that time their development has kept pace with the new machine

requirements. But perhaps of more importance they are now being made in styles designed especially for most hand buffing work. It took several years to learn how to produce the various desirable characteristics, and to eliminate the undesirable ones. And then it took more time and money to tool up for the economical manufacture of these various types. How well this has been done may be judged by the fact that the initial cost for ventilated buff wheels averages about twenty per cent less than the initial cost for unventilated conventional wheels! Further, under normal circumstances one ventilated buff wheel will outlast two of the conventional wheels. There are still jobs which are better suited to the older styles of unventilated buffs, and likely there always will be. No claim is made that one type of buff will answer all purposes. But the extent to which the ventilated buff has already made inroads on the conventional buff is indicated by the extremes of shapes, sizes, and finish of the articles seen in the accompanying plates.

Yes, buff ventilation and automatic buffing have made possible important savings in the finishing cost. Together they have improved the quality of plated surfaces while making a substantial reduction in cost. Their importance to the electroplating industry ranks them equally high with the important advances in the chemistry of plating.

SIXTH ANNUAL BANQUET

The Sixth Annual Banquet and Technical Session of Boston Branch will be held Saturday, April 13, 1940, at the Statler Hotel, Boston, Mass.

Technical Session at 2 P. M.

Banquet, floor show, and door prizes at 7 P. M.

Tickets $2.50 each.

The program for the banquet will be as follows:

Robert Sizelove, Frederick Gumm Co., Subject—"Trouble Shooting." Myron B. Diggin, Hanson-Van Winkle-Munning Co., Subject—"Ductile Nickel Deposits and Semi-Bright Nickel." E. C. Rinker, Oakite Products Co., Subject—"Cleaning Before Plating." N. E. Promisel, International Silver Co.—Subject later.

Tickets may be had from the secretary A. W. Garrett, 100 King Street, Dorchester, Mass.

Here and There

REVERIES OF A MOTOR TRIP

A few months ago, we were driving down from northern Michigan, and eight or ten miles away, we caught sight of Dead Man's Hill. That is supposed to be the site of one of the battles which Pontiac fought, although we must confess that either these alleged battles were only small skirmishes or he was a very busy Indian, considering the number of battlegrounds that are supposed to lie around Detroit. However that is beside the question. The point is that we saw the hill some eight or ten miles away, and were perfectly sure in our own mind that in ten minutes or a little more, we would pass the hill. We were nearly positive that this would be the case. Of course we might blow a tire or something else happen to the car to prevent it, but we have had three punctures in the last 125,000 miles of driving, and the chances of anything occurring was so slight as to be almost negligible.

Our own confidence as to the time was so great that it amused us and we began to think about the difference between our day and that of Pontiac. We were going to be there in ten minutes or so, while it must have taken the Indians over that hilly country pretty close to a whole day to traverse the distance. Even with a team and wagon, it would have taken a settler not less than two to three hours and perhaps more. Transportation had certainly changed.

Which led us to musing not only on changes in transportation methods in our own day but other changes in ordinary things of life. We contrasted our confidence that it would be only a few minutes with what we would have felt when we had our first car back in 1918.

That car cost us nearly twice the price of our present one. We drove that original car, which happens to be the same make as our present one, from Chicago to Detroit and it took us three days. We could make it in about eight hours now without unduly pushing.

Part of that is the difference in roads. When we went over it in 1918, it was simply a dirt road with no paving of any character. In some places the sand was pretty heavy and it was customary that when a car approached a steep hill with a sandy soil, for everybody in the car but the driver to get out and push up the hill. That was just standard practice. Nobody ever thought of going up a hill in high. They might start in second gear but they were probably in low before they reached the top.

The roads account for a good deal of the difference in time, but there is also a vast difference in cars. We are not sure, but we doubt very much that our 1918 car would run thirty miles per hour when in the best of condition, which was seldom. Barney Oldfield (the dare-devil) won the Indianapolis race with average speed a good deal less than some people make today, when just out for a pleasure jaunt. Furthermore we never knew how far any car was going to run at any given time.

If anybody went out and drove twenty-five miles and got back without a puncture it was a subject for special thanksgiving. Some tires went entirely before a thousand miles and when a man succeeded in making a tire last for five thousand miles before it had to be discarded, he became such a pest in the neighborhood, bragging about it, that people would cross the street to avoid talking to him.

Tire trouble was expected and was just a minor inconvenience, even though demountable rims were unusual, and most people either had to change tubes on the road, or as was often the case actually repair the puncture. That was regarded as just one of the necessary evils of driving. The serious troubles came from other sources. Motors, carburetors, gas-lines, axles, and springs had a disconcerting habit of failing when far, far from home.

Our father-in-law, who drove a rather high-priced car, had so many springs break on it, that he never left home without an elaborate wooden jack arrangement, which he could insert in place of springs until he could get home. The

average driver would have been just as liable to leave home without any tires, as to leave without a tow-rope in the car.

We had no bumpers, so that cars could not be pushed and had to be pulled. Garages were few and far between, and there was nothing corresponding to the modern gas station. When a driver got in trouble, he had to get out of it, generally without assistance, or only volunteer aid. There was camaraderie on the road between drivers. When one driver had difficulty of any kind, every driver that came along stopped and offered advice or help. Some of those drivers, due to the trouble they had encountered, knew more about automobiles than some of the engineers who were designing them. Everyone helped even if it meant crawling under the car in the dirt, and someway they either got the fellow going again or dragged him to a town where a garage was located.

We recall that about 1905, we were living in Central Ohio and a boy from Cleveland came back to spend the summer with his grandmother. His father was pretty well-off, and he was the only boy we knew who had a car of his own. Every day that summer the owner of the car and another boy, and two girls, one of which was our sister, started out for a ride. We are sure they never went twenty-five miles on any day, but also they never once succeeded in getting back home in the car under its own motive power. They almost made it once. They came within a block of home before it broke down. Do not misunderstand us. This was not the fifth-hand $25 jaloppy of the modern high-school student. This was a brand new car, one of the best and highest priced makes on the market. Nobody expected anything different. One was just lucky if he got home without trouble, although this experience was perhaps a trifle unusual.

Contrast that with our absolute confidence that we would do ten miles in ten minutes, and one sees how far we have come in thirty-five years.

But even the car of our Cleveland friend was a tremendous advance over anything we had known previously. We spent the early part of our life in Chicago, and the ordinary method of transportation was what was called horse cars, although as we recall it, they were really mules. Dinky little cars of the general type of the "Toonerville Trolley" were hitched to a team of mules. We have no idea how slowly they went. The mules simply walked. Once in a while our parents, on a Sunday afternoon, would take us on a ride to the end of the car line, which was about two miles away, and our recollection is that it took the better part of the afternoon to go there and back.

However, that had changed before the automobile came into use. First came the cable cars. Heavy steel cables were dragged by motors in a passage under the street. The motorman, in the "Grip-car," handled long pincers which went through a slot in the street. When he wanted to go, he caught hold of the cable with the pincers and continued to travel until he wanted to stop, when he released his grip and stopped. Very simple but quite marvelous as compared with the horse car.

Eventually the trolley car arrived. They were pretty small at first and pretty rocky in their motion. A lot of time was lost while the conductor fished around trying to get the trolley back on the wire. It had a habit of bouncing off with a glorious Fourth of July shower of sparks. The trolley cars moved along pretty well when they were getting current and rather prepared us for the breath-taking speed of the early automobiles, which might do fifteen to twenty miles per hour.

Transportation has advanced a long way since Pontiac's time, but when we eliminate the steam locomotive, practically all of it has come within the life of the writer, and the modern streamlined, Diesel or electric-powered railroad train is a long cry from the puffing, panting, smoke-emitting steam engine of our youth.

Just as the bulk of the advance in transportation has come in our lifetime, we mused, so have the advances in a lot of other directions.

Take the matter of house lighting. It would probably seem strange to most readers even to think of a house without electricity. Understand that we were not raised out on a farm somewhere. We were born in Chicago and lived there

until we were sixteen years old. In addition our father made a good living as the day went and we lived under what were considered comfortable circumstances.

However, we had no electricity in the house. We cooked with gas, and we used gas for illumination. In all the rooms, were gas pipes, topped with a stop-cock and burner. When anyone went into a dark room, he scratched a sulphur match on the sole of his shoe, turned the cock, and lit the gas, making a broad yellow flame. This lit up the room to the extent that one would not bump into the furniture and it was possible to dress and undress by its aid, but it was a long way from bright. It was not possible to read by the light, and nearly everybody had a reading lamp in the livingroom.

That meant that they had a large kerosene-burning lamp on a center-table usually a round one. They were very handsome articles. Our lamp must have been six or eight inches in diameter, and had beautiful hand-painted flowers on it. At night the whole family would arrange themselves around that reading lamp, more or less like the spokes of a wheel, with the light coming over the shoulders of each one, and woe be unto anyone that wanted to converse.

Kerosene was one of the principal articles of commerce in the grocery store. As we look back, it seems to us that we spent half of our time dragging a kerosene can back and forth between home and the grocery store. In spite of our impression, the grocery store certainly delivered the kerosene part of the time. When anyone bought a kerosene (or as it was generally called, a coal-oil) can, he received a small cork for the spout, but usually before very long the cork wore out or was lost. Then the groceryman would seal the spout by sticking a small potato on it. The potato was rather easily dislodged with the result that every once in a while, everything we had for supper had a very distinct taste of kerosene, because the coal-oil had sloshed out on the rest of the groceries in the horse-drawn delivery truck.

The first real improvement came with the Welsbach mantle. The writer has no idea now what this mantle really was. We bought a rigging which screwed onto the gas burner. It was a white mesh of some material in a cylinder shape. After attachment, it was burned by lighting with a match. It flared up and made a very bad stench in the house. After burning, it left a white ash in the same cylinder-mesh form. Miracles of miracles, when the gas was now lighted it glowed through this ash with a nice bright white light, by which one could read. It had one weakness, however. It was nothing but ash, and any jar would cause it to disintegrate, so that if one of the children jumped off the sofa too hard, or anybody danced in the apartment above, we might suddenly be in comparative darkness, and somebody would have to start for the drugstore in a hurry. However they were a great improvement over anything which we had had previously.

Some few very rich people had electricity in their homes but the average person never thought of it until we were nearly grown. It cost about $200 to wire a house and that was considered a sum beyond the means of most people. A great many were rather large families with a total income of sixty dollars per month.

Naturally without electricity in the house, there was no chance of vacuum-cleaners, electric stoves, toasters, washing machines, electric refrigerators or any other of the household helps which depend upon electricity for power.

Very few people had telephones. The nearest telephone to us was in a drug-store two blocks and a half away. If we needed a doctor, we had the choice of running to the drugstore, or running to the doctor's. It was about as easy to go to the doctor's.

When telephones did begin to appear in private homes, they were pay stations, in the sense that a nickel had to be deposited each time to get the connection, just as in a modern pay station. There was a great deal of dissatisfaction over that because sometimes nobody had a nickel when needed, so the telephone company began to furnish slugs to the householders, and then when the collector came the slugs were returned, and the householder paid a nickel for each slug in the box.

We never lived in a home without running water, although we visited relatives in small towns where we had to go out to the old back-house, and on Saturday night the entire family successively went into the kitchen to take their baths, standing up in a galvanized iron washtub.

We always had running water in our home, but when we look at the modern tile, chromium and porcelain equipped bathroom, and then hark back to what we had, it was not much. We are a little hazy as to the washbowl, although we seem to recall that it was made of dark-colored stone of some character.

However, recollection of the bathtub is clear. That was of tin, with wooden boards around the top and down the sides. We have no recollection of any hot-water tank in the basement or elsewhere, so the chances are that when hot water was needed it was heated on the stove and carried up, but we are not sure about that. Maybe we had some means of heating water that was carried to the bathroom by city pressure. Anyway, it would not be considered much of a bathroom today.

Standard price of milk was five cents per quart but it was not delivered in a glass bottle. The milkman came along the street and rang a bell. All the women came out of the houses with pitchers and all sorts of containers. The milkman had a quart measure on the end of a long handle. He dipped down into the milk can, ladled out a quart of milk, poured it into whatever container the woman had, and received a nickel. Very simple. No credit, and no complicated arithmetic.

We did not have the choice of foods that we have today. Refrigerated cars were used but not to the extent of the present time. In the main we had fresh things that were in season within a reasonable distance but we did not begin to have strawberries in January and continue until August. Neither was there the choice of all manner of foods in glass cans and tin cans. We did not have anywhere near the choice of foods, but we did not starve to death. In fact we thought we were getting along pretty well.

The average woman did a great deal more baking than she does today. It was difficult to buy really good baked foods, with the result that she did it herself. She even made most of her own bread. Personally, we like bakers' bread. It is lighter, and we doubt if any woman can do it as well as the way bread is manufactured in a large bakery with all the controls on mixing, oven heat, etc. However we must confess that nothing has ever tasted quite as good as when our Mother called from the kitchen door that the bread was out of the oven, and we would go in and get a slice about three-quarters of an inch thick and so hot that the butter would melt immediately and run all through it. We recall that some of the neighbor women who knew it was unhealthy to eat hot bread (it had to get a little dry to be healthful) predicted that we would die early because of being fed that impossible food, but we have managed to fool them quite awhile.

In comparison with what the average family has now, we did not have much but all things are comparative, and alongside of our relatives who lived in small towns, we were living in luxury. We were well content with what we had.

We have a good deal of admiration for the younger generation. Every year the high schools and colleges are dumping millions of them out into a world that does not need them, has no place for them, and is stacking the cards against them in every way that it knows how. These kids are a lot smarter and better educated than we were at the same ages, and they are perfectly well aware of what they are up against. They have no illusions but one hears very little griping from them. They are accepting the contest, in the main, on the rules that the opponents made — and more power to them.

However where one of them becomes a little discouraged and feels that perhaps it is not fair that he, in particular, is the victim of a system which he had no part in forming and under which he is getting an impossible break, it would be well that he recall that he has probably already lived a quarter of his life under conditions of luxury that his father lacked in his youth, and that his grandfather could not have had if he had been as rich as Croesus. They simply were not available at any price.

We have seen it estimated that electricity does more for every man, woman and child in this country every year than could be done by twenty slaves.

Back in the old Roman days, it was a pretty rich man that owned twenty slaves. But every one of us has an equivalent of those twenty slaves working for us whether we know it or not. Of course having seen some artists' conceptions of a Roman banquet, we have always had a hankering to trade our twenty for the Roman's, just for one night anyway.

But our discouraged youth might do well to consider that at the worst he is probably a lot better off than the generations ahead of him and they thought they were doing pretty well. It is all relative.

At this point, we had passed Dead Man's Hill and pleasantly covered another thirty miles, and so were home.

W. B. KNIGHT

THE PLATING AND RUSTPROOFING ASSOCIATION OF MICHIGAN

The Plating and Rustproofing Association of Michigan is now entering its third year. Mr. Charles H. Nehls, president of the Wayne Metalcraft Corporation, was added to the Board of Directors and other members of the Board were re-elected at the annual meeting held March 2. Mr. W. B. Knight, president of the Knight Plating Company, was elected president for the coming year of 1940-41; Mr. Robert L. Reed, president of the Robert L. Reed Plating Company, was elected vice-president, and Mr. Frederick R. Bolton was re-elected for the third year as secretary and treasurer.

During the past year several more large companies were added to the roster of the Association and it seems to be growing slowly but steadily.

The Association is just concluding its first year under a working agreement with the Metal Polishers, Buffers, Platers and Helpers International Union, Local No. 1 (A. F. of L.) without any labor difficulties and we are about to enter into discussion for the renewal of the same contract. The Association is continuing its credit bureau which it inaugurated during the past year and which produced very satisfactory results. Contacts have been established with the manufacturing industry and at the last meeting of the Board, Mr. James W. Higgins of the Packard Motor Car Company and president of the Detroit Branch of the American Electroplaters' Society was elected for and accepted honorary membership in the Association.

A Discussion *of the* Common Complex Metal Cyanides *in* Cyanide Plating Solutions

ALBERT G. TRACY
Grand Rapids Branch A. E. S.

A GREAT deal of confusion has resulted from the conflicting reports on the form of the complex metal cyanides in the cyanide plating baths. Also, there are several conflicting methods found for determining the so-called "free" cyanide in cyanide plating solutions. For these reasons the following investigation was made:

It must be understood that in all the following calculations, all chemicals are assumed to be one hundred per cent pure.

I. COPPER CYANIDE

Copper Cyanide (CuCN) has always been considered to exist in a cyanide solution as $Na_2Cu(CN)_3$. Therefore, 1 lb. of CuCN would require 2 $\frac{NaCN}{CuCN}$ or $\frac{98}{89.57}$ or 1.093 lbs. of NaCN to completely dissolve it.

To verify this, solutions were made up of known weights of CuCN and NaCN. An excess of NaCN was used (calculated from the above relation) and this excess or "free" sodium cyanide as it is commonly called was measured by titration with silver nitrate and also with copper nitrate. The conclusion was that 1 lb. of CuCN requires 1.093 lbs. of NaCN to dissolve it.

Recently it has been shown that a high temperature of the sample being tested gives a higher value of "free" cyanide than a lower temperature. This seems to be the case, especially when the solution being tested has a relatively low "free" cyanide to metal cyanide ratio. For this reason it has been recommended that a uniform temperature, such as the temperature of melting ice, be used for all "free" cyanide determinations. However, for all "free" cyanide determinations made in this investigation a temperature of approximately 70° F. was used since all of the plating solutions involved in this discussion are operated at room temperature or slightly above.

It might be well at this point to give the equations and calculations for the two methods used in measuring the "free" cyanide.

A. Silver Nitrate Method

The NaCN and the CN that is in combination with the copper in the formula $Na_2Cu(CN)_3$ does not enter in the reaction.

2 NaCN plus $AgNO_3$ equals $NaAg(CN)_2$ plus $NaNO_3$.

The silver nitrate solution used is usually .1 N. This contains

$$\frac{169.88}{10} \times \frac{1}{1000} \text{ equals } .016988 \text{ g./c.c.}$$

Therefore:

$$\text{oz./gal. NaCN equals c.c. } AgNO_3 \times .016988 \times \frac{98\ (2NaCN)}{169.88\ (AgNO_3)} \times \frac{1000}{\text{c.c. in sample}} \times .1335.$$

For a 10 c.c. sample we have

oz./gal. NaCN equals c.c. $AgNO_3$ x .131

and for a 2 c.c. sample

oz./gal. NaCN equals c.c. $AgNO_3$ x .655.

B. Copper Nitrate Method

Again in this reaction the only NaCN that enters is that which is in excess of the formula $Na_2Cu(CN)_3$.

7 NaCN plus 2 $Cu(NO_3)_2$ plus 2 NH_4OH equals H_2O plus 2 $Na_2Cu(CN)_3$ plus 2 $NaNO_3$ plus 2 NH_4NO_3 plus NaCNO.

The copper nitrate solution is usually standardized against sodium thiosulfate. This gives a value of g.Cu/c.c. Therefore:

$$\text{oz./gal. NaCN} = \text{c.c. } Cu(NO_3)_2 \times \text{g.Cu/c.c.} \times \frac{343\ (7NaCN)}{127.14\ (2\ Cu)} \times \frac{1000}{\text{c.c. in sample}} \times .1335.$$

For a 10 c.c. sample, we have

oz./gal. NaCN = c.c. $Cu(NO_3)$ x g.Cu/ c.c. x 36.

II. ZINC CYANIDE

Of the three metal cyanides studied, $Zn(CN)_2$ proved to be the most interesting and the most difficult to understand.

Ordinarily the soluble complex cyanide of zinc has been considered to be $Na_2Zn(CN)_4$. Then a paper which had been read by Dr. L. C. Pan before the American Electroplaters' Society, June

20, 1932, was published. In this paper the conclusion was that zinc existed in a cyanide solution as $NaZn(CN)_3$.

In short Dr. L. C. Pan calculates it takes

$$\frac{NaCN}{Zn(CN)_2} = \frac{49}{117.4} = .417 \text{ lbs. of NaCN to dissolve 1 lb. of } Zn(CN)_2.$$

This is only half the amount usually figured:

$$\frac{2\,NaCN}{Zn(CN)_2} = \frac{98}{117.4} = .835 \text{ lbs. of NaCN.}$$

In order to prove which of the above is correct, solutions were made up of known weights of $Zn(CN)_2$ and NaCN. It was found that when only .417 lbs. of NaCN were used for 1 lb. of $Zn(CN)_2$ that it was impossible to get the $Zn(CN)_2$ all in solution. It must be kept in mind that *no* NaOH or Na_2CO_3 had been added to the solution. NaCN was added until the $Zn(CN)_2$ was all dissolved and it was found that .835 lbs. of NaCN were required for 1 lb. of $Zn(CN)_2$. The correct complex formula is therefore $Na_2Zn(CN)_4$.

Then excessive amounts of NaCN were added and the "free" NaCN measured by means of the silver nitrate titration and the copper nitrate tritation. Here it was interesting to note that the silver nitrate method gave the "free" NaCN present over and above the complex compound, $Na_2Zn(CN)_4$, while the copper nitrate method gave the *total* NaCN leaving the zinc as $Zn(CN)_2$. Ordinarily the $Zn(CN)_2$ would be precipitated, but it is soluble in NH_3. Therefore, as we have a great excess of NH_4OH in the sample being titrated in order to give a sharp endpoint, no precipitate is formed.

Next various amounts of Na_2CO_3 were added to the solutions being tested and the effect on the two methods of measuring "free" cyanide noted. When titrating with $AgNO_3$ it was found that the Na_2CO_3 tended to release some of the NaCN in the complex $Na_2Zn(CN)_4$ thus making the "free" NaCN appear to be more than it actually was. The more Na_2CO_3 added the greater the "free" NaCN became until it approximated the total CN as NaCN. This may be explained as follows: Na_2CO_3 dissociates in water to form a weak acid (H_2CO_3) and a strong base (NaOH). $Zn(CN)_2$ is readily soluble in NaOH forming NaCN.

$$Zn(CN)_2 + 4NaOH = Na_2ZnO_2 + 2NaCN + 2H_2O.$$

Thus the more Na_2CO_3 present during the titration the more

NaCN will be released to enter the reaction with $AgNO_3$. The Na_2CO_3 had no effect on the copper nitrate titration.

In order to make the solutions behave as brass or bronze plating solutions, different amounts of CuCN were added. Both methods of titration gave the same results as above except the "free" NaCN value was reduced 1.09 oz./gal. for each oz./gal. CuCN added.

Then a large excess of NaOH was added to the samples being titrated and the effect noted. The silver nitrate method then gave the total CN content as NaCN, all of the $Zn(CN)_2$ being dissolved to form Na_2ZnO_2 and NaCN. The copper nitrate titration behaved very peculiarly. The CN content which, as stated before as being equal to the total NaCN present, increased somewhat but did not equal the total CN content. This may be explained by assuming that the presence of an excess of NaOH breaks down some of the soluble compound of $Zn(CN)_2$ dissolved in NH_3, liberating some NaCN. The fact that all the CN was not liberated as NaCN indicates that there is some unstable equilbrium between the NaOH, $Zn(CN)_2$ and NH_3. There seemed to be no definite relation between the values obtained so the following tests were made.

Different amounts of NaOH were added to the solutions being tested to give pH values of 10.0 to 12.6. The silver nitrate method gave the same results as with the tests conducted with the Na_2CO_3 alone, that is, the "free" NaCN value obtained was not a true measure of the NaCN existing over and above the $Na_2Zn(CN)_4$. The copper nitrate method gave the total NaCN in the solution the same as with the Na_2CO_3 tests. From this it can be concluded that the $AgNO_3$ titration is not reliable for determining the "free" cyanide of brass or bronze solutions, and that the copper nitrate method gives a total NaCN value from which must be deducted the NaCN necessary to dissolve the $Zn(CN)_2$ present in order to arrive at the true "free" NaCN value. The copper nitrate method is the most consistent within the usual pH range and can be used on the solution samples direct, and is, therefore, more desirable. It is possible to use the silver nitrate method if the Na_2CO_3 is first removed by precipitation with $Ba(NO_3)_2$ and filtering.

The next solutions studied were strongly alkaline solutions of $Zn(CN)_2$ and NaCN or regular zinc plating solutions. Solutions were made up of known weights of $Zn(CN)_2$, NaCN, and NaOH.

Here the copper nitrate method gave rather erratic results as to the total CN present as NaCN, and the end point, which at best is none too sharp, was very difficult to determine. The silver nitrate method gave very good results in measuring the total CN content as NaCN. Some procedures include the addition of KI indicator to give a precipitate of AgI as the endpoint while others omit it and use the formation of Ag_2O precipitate as the endpoint.

$$Na_2ZnO_2 + 4\ AgNO_3 = 2Ag_2O + 2\ NaNO_3 + Zn(NO_3)_2$$

However, the Ag_2O precipitate does not give a sharp endpoint and it was found when titrating solutions of known composition that a high result was obtained unless a great deal of care was taken. The addition of a small amount of KI made it very easy to determine the endpoint. When titrating a sample of zinc solution a large excess of NaOH is added to aid in forming the Na_2ZnO_2. It was found that NH_4OH would work equally as well provided the KI indicator is used. If the KI is not present the Ag_2O dissolves in the NH_4OH and no endpoint is reached. In a zinc solution the zinc undoubtedly exists as both Na_2ZnO_2 and $Na_2Zn(CN)_4$. Therefore, the total CN as NaCN minus the CN in the $Zn(CN)_2$ as NaCN gives at best only an approximation of the "free"NaCN.

When ZnO is dissolved in a solution of NaCN only 1.2 lbs. of NaCN are required for 1 lb. of ZnO. It might be that some persons would reason that 4 NaCN molecules would be needed for 1 molecule of ZnO in order to supply the 4 CN radicals in the complex compound $Na_2Zn(CN)_4$. The explanation of this lies in the fact that when ZnO is dissolved in a cyanide solution NaOH is formed which in turn dissolves some ZnO. Thus:

$$ZnO + 4\ NaCN + H_2O = Na_2Zn(CN)_4 + 2\ NaOH$$

$$2\ NaOH + ZnO = Na_2ZnO_2 - H_2O$$

Therefore, 1 molecule of ZnO only required 2 molecules of NaCN to form the water soluble compounds, or 1 lb. ZnO requires $\frac{2\ NaCN}{ZnO}$ or $\frac{98}{81.4}$ or 1.2 lbs. of NaCN.

III. CADMIUM OXIDE

When CdO is dissolved in a cyanide solution 4 molecules of NaCN are required to dissolve 1 molecule of CdO. Thus:

CdO plus 4 $NaCN$ plus H_2O = Na_2 $Cd(CN)_4$ plus 2 $NaOH$.

CdO is *not* soluble in $NaOH$ as was ZnO. Therefore, 1 lb. of CdO requires $\frac{4\ NaCN}{CdO}$ or $\frac{196}{128.4}$ or 1.53 lbs. of $NaCN$ to dissolve it.

When titrating for total cyanide it was found that both the silver nitrate and the copper nitrate methods gave the correct result. However, with the silver nitrate method it is essential that a large excess of NH_4OH be present in the sample to dissolve the $Cd(CN)_2$ as the $NaCN$ is removed from the complex compound, $Na_2Cd(CN)_4$. If this is not done the $Cd(CN)_2$ precipitates making it difficult to determine the endpoint of AgI. The NH_2OH is always added in the copper nitrate method regardless.

Because of the difficulty in determining the endpoint without the NH_4OH present it is not advisable to try to titrate the "free" $NaCN$ direct. It is better to titrate the total CN as $NaCN$ and then deduct the $NaCN$ required to form the complex compound $Na_2Cd(CN)_4$.

As the endpoint is much easier to determine when using the silver nitrate titration instead of the copper nitrate method, the former method is to be preferred.

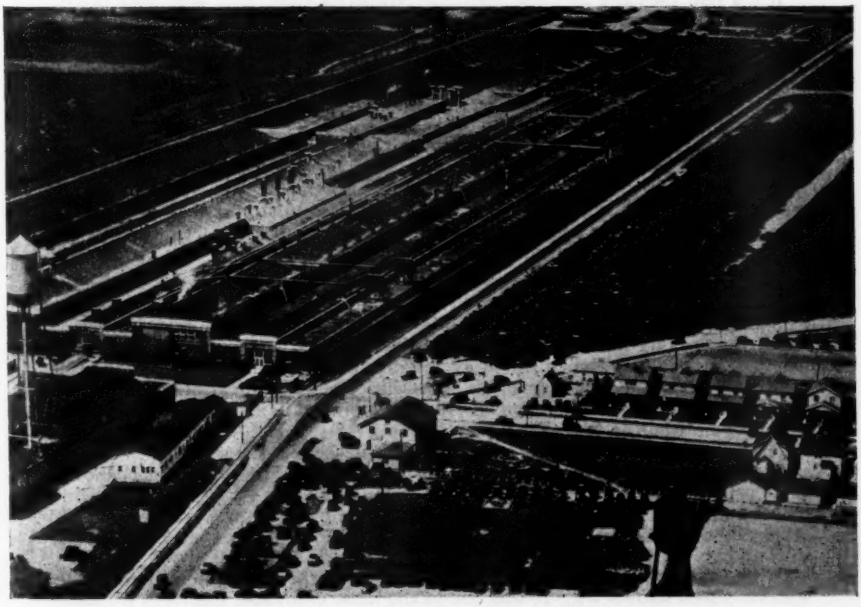
CONCLUSIONS:

1. $CuCN$ dissolves in a $NaCN$ solution to form $Na_2Cu(CN)_3$.
2. The $AgNO_3$ titration is the most accurate and simple method of determining "free" $NaCN$ in a cyanide copper solution.
3. $Zn(CN)_2$ dissolves in a $NaCN$ solution to form $Na_2Zn(CN)_4$.
4. $Zn(CN)_2$ dissolves in a $NaOH$ solution to form Na_2ZnO_2 and $Na_2Zn(CN)_4$.
5. ZnO dissolves in a $NaCN$ solution to form Na_2ZnO_2 and $Na_2Zn(CN)_4$.
6. ZnO dissolves in a $NaOH$ solution to form Na_2ZnO_2.
7. The copper nitrate titration gives the most accurate and consistent results in determining the $NaCN$ content of solutions such as brass or bronze which are not strongly alkaline. The value obtained here gives the "free" or uncombined $NaCN$ plus the $NaCN$ combined with the $Zn(CN)_2$.

8. The silver nitrate titration when used with KI as an indicator gives the most accurate results on strongly alkaline zinc plating solutions. This value represents the total CN in the solution as NaCN.
9. CdO dissolves in a cyanide solution to form $Na_2Cd(CN)_4$.
10. Neither CdO nor $Cd(CN)_2$ are soluble in NaOH.
11. Both CdO and $Cd(CN)_2$ are soluble in NH_4OH.
12. The silver nitrate titration is best for determining the total CN content as NaCN in cyanide cadmium solutions, providing an excess of NH_4OH is present in the sample to keep the insoluble $Cd(CN)_2$ from retaining any CN. The "free" NaCN in oz./gal. then equals the total CN as NaCN in oz./gal. minus 1.53 times the oz./gal. of CdO.

WING YOUR WAY TO DAYTON, THE BIRTHPLACE OF AVIATION

Aerial Photo by Mayfield Aerial Surveys, Dayton, Ohio.



MORAINE CITY PLANT, FRIGIDAIRE DIVISION
General Motors Corporation, Dayton, Ohio.

Here and There

Boston The Hub of the Universe, according to present indications, will be the entertaining city for the 1941 Convention. The one and only secretary Boston Branch has ever had, Andrew Garrett, received letters from several of the other branches assuring him of their support. On the strength of this assurance, the boys are doing a lot of thinking and planning. Having had a little experience in the past years, we outlined to the many members present at the meeting on Thursday, March 7, some of the immediate requirements necessary to the running of a successful convention.

Boston Branch has many very capable members upon whom can be laid the responsibility of filling the various offices, should the delegates vote to hold forth in the Massachusetts capital in 1941.

We were a little bit disappointed at not seeing Colgate Gilbert and Ed Javelli at the meeting. Living in Walpole, N. H., and having to drive over one hundred miles, Mr. Gilbert has a good excuse, especially considering our recent New England weather. Mr. Javelli, we are told is an extremely busy man at the Campbell Company. We hope to get together at the Boston annual meeting, April 13.

Frank Clark of the Hanson-Van Winkle-Munning Co. gave a short talk on "Some Bright Nickel Problems" and told also of the new electroplating process on stainless steel. At the close of the meeting, a general discussion was enjoyed, regarding problems with which some of the members are confronted.

* * *

It's a real pleasure to meet men like Arthur Mintie, past president of the Branch. Mr. Mintie's counsel and advice is eagerly sought after by the other members, young and old. . . . Where was Charlie Hardy? . . . Strange as it may appear, Harry Lack was present but didn't try to start anything. We hope your arm continues to improve, Harry. . . . There were several Worcester members there including the Marshalls, father and son. . . . Bill Jones is the type of fellow that should get plenty to do. We like his method of doing things. . . . Ed DeLorme, the president, has lots of patience, but can use the gavel when necessary. . . . Izzy Baker is in Honolulu. . . . Joe Barron of the M. E. Baker Co. furnished us with free transportation from Springfield. We were pleased to meet Mrs. Barron and their little girl. Thanks, Joe, Boston branch is counting heavily on you for the success of the annual event and for the Convention, if and when it comes to Boston.

Newark "Cyanide Bill" Schneider was the attraction at the Newark Branch meeting on Friday, March 1. His subject was "Black Molybdenum Finishing." Before going into the subject, Paul Oldam, the Branch librarian, asked the speaker how he acquired the nickname. It's a long story and goes back to the early days when Bill was a foreman plater. Bill demonstrated to the trade so successfully the marvelous possibilities of sodium cyanide which has since then replaced the more expensive potassium cyanide, that he was known wherever he went as Cyanide Bill.

The paper on "Black Molybdenum" was the best we have heard, and the samples (each member was given a free ash tray finished in Moly-Black) shown were very favorably commented on, especially the coil spring to which Bill pointed with considerable pride. Some of the samples shown were zinc plated, others tin or cadmium plated previous to the final finish, the base metal being steel and zinc base die castings.

A long discussion followed the reading of the paper, interspersed with the speaker's well known wit. It was one of the most enjoyable meetings we have attended for some time. An honest statement regarding the value of this finish and an equally frank statement as to its limitations were well received by the members present, of which there were nearly one hundred. Mr.

Schneider left for Florida shortly after the "after meeting." We hope he will have a couple of weeks of rest and real recreation.

* * *

Byron Hogaboom and the speaker didn't agree on everything. . . . Frank MacStoker, Lionel Cinnamon, A. H. Braun, and several other New York members were present. . . . John Kotches makes a fine presiding officer. . . . when we speak of librarians, Paul Oldam is tops, and don't forget the faithful secretary, George Wagner. . . . Nearly all the officers answered the roll call. . . Horace Smith keeps smiling, he thinks the Convention should be a yearly event at Asbury Park, but he also likes Boston. . . . Phil Sievering and Nelson hardly miss, Bob Sizelove also gets around. . . . There's a friendly feeling amongst the Newark members that makes us want to come again. By the way, Frank England, we mailed your back copies of the REVIEW.

DR. BLUM VISITS THE PACIFIC COAST

Dr. William Blum of the National Bureau of Standards started for California early this month, accompanied by Mrs. Blum. His trip will include a stop in New Orleans where he will address the local section of the American Chemical Society. He will give two talks in San Francisco on March 23 and three in Los Angeles during the week ending March 30, in connection with the sixth annual meeting of that branch. Members of the American Chemical and the Electro-Chemical Societies have been invited to the meetings in California.

Returning home Dr. Blum will be the speaker at Grand Rapids Branch on April 11 and Detroit Branch April 12.

HAROLD R. SMALLMAN

Harold R. Smallman, for many years in charge of the Chicago District Office of the Hanson-Van Winkle-Munning Company of Matawan, N. J., manufacturers of electroplating equipment and supplies, has been made Western Manager of the Company.

Mr. Smallman's business career embodies a broad experience in the electroplating industry as well as early shop and field training as an electrician. In 1916 he joined the Howe Electric Company of Chicago, staying with them until the War. In 1917 and 1918, he was in the 108th Engineers, 33rd Division, and after his discharge, he rejoined the Howe Company, remaining with them until 1920, when he left to go with the Armour Company. In 1921 he joined the forces of A. P. Munning and Company, manufacturers of electroplating equipment and supplies.

For four years he served that company as a salesman in the Illinois, Indiana and Iowa territories. In 1925, he was moved to the headquarters of the company in Matawan, N. J., as a sales executive. In 1927, A. P. Munning and Company was merged with the Hanson-Van Winkle Company to form the Hanson-Van Winkle-Munning Co., and Mr. Smallman continued to act as sales executive for the combined organization. In 1929, he went back again to the Middle West as district manager of the Chicago territory where he has remained to date. His appointment to the post of Western Manager broadens his responsibilities to include executive as well as sales supervision.

Harold Smallman is one of the most popular figures in the organization. His energy, his knowledge of the electroplating industry, his tact and his ability to make friends have been assets of great value both to himself and to the organization. He has a large and flourishing family — a wife, three boys and two girls — but he still has time for golf, fishing and bowling.

Mr. Smallman has the good wishes of all of the Hanson-Van Winkle-Munning Company and of his many friends throughout the trade in the territory which he has so long served.

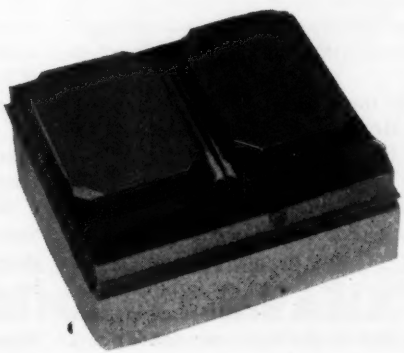
WING YOUR WAY TO DAYTON, THE BIRTHPLACE OF AVIATION

'Round the Circuit
of the Metal-Working Industry
Management Looks to the
LEA METHOD OF FINISHING
to Lower Production Costs

SATIN finish, high lustre, bright plating . . . for all, the LEA METHOD OF FINISHING has much value. Production costs are reduced because fewer polishing, buffing, or cleaning operations are necessary. Why not investigate the LEA METHOD for your operations? It costs you nothing. Just send us unfinished and finished samples together with a summary of your present methods.

THE LEA MFG. CO., WATERBURY, CONN.

Specialists in the Production of Clean-Working Buffing and Polishing Compounds



BRANCH NEWS

Business and Social News | Educational Activities

AMERICAN ELECTROPLATERS' SOCIETY

Anderson Branch of the American Electroplaters' Society held their January meeting at the Y.M.C.A on Tuesday evening, January 9, at 6:30 p. m.

Mr. H. W. Faint, sales manager of the polishing and buffing machinery department of the Continental Roll & Steel Foundry Co., was the speaker of the evening. Mr. Faint's subject was the "New Slow Speed Method of Polishing." The method consists of the use of loose abrasive on a slow speed wheel at about two hundred pounds pressure. This process promises to solve many of the plater's problems and to have quite an extensive use in the future.

Many questions were discussed after the talk regarding the process and I think that everyone present benefited a great deal by attending.

Anderson Branch. The February meeting was held on January 30, at the Y.M.C.A. at 6:30 p. m. We had an opportunity to have our old friend George Hogaboom with us on this date so our February meeting was set up to conform with Mr. Hogaboom's schedule.

The meeting was very well attended and Mr. Hogaboom gave a very enjoyable talk on "Some Overlooked Problems in Electroplating." After Mr. Hogaboom's talk a general discussion of plating problems was entered into by most of the members present. It seemed to be the general opinion that this was one of the best meetings we have had so far this year and I think that everyone left with several new ideas and a better understanding of what the future of the electroplating industry holds.

A business meeting was held after Mr. Hogaboom's talk and four applications for membership were brought up and passed on, all being elected to membership in the Branch. Plans for a class in practical plating problems were discussed but no conclusions were reached in this matter. With no other business at hand the meeting was adjourned.

OTTO W. MCCALLISTER, *Secy.-Treas.*

Grand Rapids Branch held its last monthly meeting February 8, at the Rowe Hotel, and was called to order by President Werft. There were several visitors and our president requested them to introduce themselves, which they did.

Our president then appointed a nominating committee to prepare a slate for the coming election. Reports of the various banquet committees were received and commented upon.

The secretary was instructed to write Mr. W. J. R. Kennedy, executive secretary, and inform him that this Branch went on record favoring the limitation of honorary members to ten.

It was also reported that Dr. Blum of the Bureau of Standards would be our speaker in April, the meeting to be an open one.

Mr. Paul Strausser of the F. B. Stevens Company of Detroit gave a short talk on Magna-Gage, determining the thickness of the plate.

Mr. H. G. Dyktor, chief engineer from the Michigan State Health Department, Industrial Hygiene Division, Herman Keefer Hospital, Detroit, was

To You–

As Good As You Are

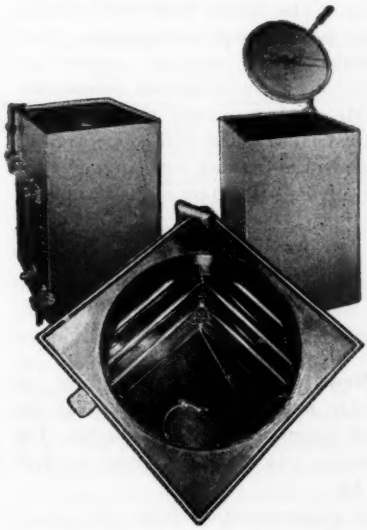
Your FINISH is what you make it

The first plating rack of work immersed in a "still" tank of sparkling clean, clear water . . . like the first drink of a sparkling champagne . . . starts a solution. Repeated immersions of either, gradually builds-up solution strength to a point of contamination.

In the one, your plating FINISH is impaired. In the other your FINISH also remains to be seen. Both can only be . . . nothing more or less than . . . what you make them.

As a contrast . . . the last plating rack of work passing through "VORTEXEDDY" Spray Rinse Tanks . . . at the close of the day . . . meets with the same sparkling clean, clear water as the first rack . . . There is no solution build-up . . . There is no contamination . . . A good FINISH is assured and secured.

The no obligation booklet "Rinsing With Spray" describes the reasons WHY. Send for your copy NOW.



●

YOUR NEAREST UDYLITE OFFICE WILL GLADLY AND PROMPTLY SERVE YOU

●

The Udylite Corp., Chicago, Ill.
The Udylite Corp., Detroit, Mich.
The Udylite Corp., New York, N. Y.
The Udylite Corp., Cleveland, Ohio
J. C. Miller Co., Grand Rapids, Mich.
Donald Sales & Mfg. Co., Milwaukee, Wis.
L. H. Butcher Co., San Francisco, Cal.
L. H. Butcher Co., Los Angeles, Cal.
Electroplating, Inc., Atlanta, Ga.
MacDermid Inc., Waterbury, Conn.
F. H. Bathke, St. Paul, Minn.

●

STORTS WELDING COMPANY

42 STONE STREET **MERIDEN, CONNECTICUT**

Manufacturers of Welded Fabrications to Specification

the speaker, and was introduced by C. W. Smith. His subject, "Health Hazards in the Electroplating Industry," was supplemented with slides showing examples of good and bad conditions in the polishing and plating room. Control of the health hazard in chromium plating is one of the more obvious.

Solvent fumes produce permanent physical damage causing liver disease and even death. The best remedy is totally enclosed systems. The fumes from cyanide, cadmium, zinc and copper may be very irritating and should be removed by adequate exhaust equipment.

Spaces in which fumes are present should have twelve changes of air per hour. The fumes from acid pickling may be extremely dangerous. Such metals as lead, mercury, arsenic and antimony form poisonous compounds.

Mr. Dyktor stated the Bureau of Industrial Hygiene will cooperate in a confidential manner with anyone wishing advice or help on industrial health problems.

CHAS. S. WHALLEY, *Secy.-Treas.*

Wing Your Way to Dayton
the Birthplace of Aviation

Newark Branch, A.E.S., met on Friday evening, February 16, at the Club Room of the Hotel Douglas. The meeting was called to order at 8:30 P. M.

A communication from Mr. J. L. Downes and one from Mr. G. Lewis Smith, both pertaining to branch exhibits at the Dayton Convention, were read and Mr. Paul A. Oldam was appointed chairman of a committee for exhibits from Newark Branch.

An application from Mr. Eugenio Villacorta of Cebu City, Philippines, to associated membership was voted by the members to take the regular course.

Mr. Laurie Salerno of Phelps Dodge Corp. was then elected to associate membership.

Mr. George Wagner, chairman of the Newark-New York Educational Session reported that he, Horace Smith, John Kotches and Paul Oldam had visited New York on February 9 to talk over matters concerning this event. New York Branch is working hard to assist in making this a real success. Mr. Oldam who is in charge of the Educational Session stated that the speakers will be as follows: (1) Mr. Oscar A. Mockridge of Johns-Manville Co., New York, N. Y., subject "Celite, the Story of the Diatom" (motion picture); (2) Mr. George B. Hogaboom of Hanson-Van Winkle-Munning Co., Matawan, N. J., subject "Research"; (3) Mr. R. O. Hull of E. I. du Pont de Nemours &

EXPERIENCED ELECTROPLATERS
prefer
ANACONDA
Copper Anodes
... because their unexcelled purity assures uniform corrosion, the highest quality deposit in the shortest possible time and low scrap losses. Furnished with suspension holes drilled as desired, or tapped for end hooks.
ANACONDA
THE AMERICAN BRASS CO.
General Offices, Waterbury, Conn.
Offices and Agencies in Principal Cities

Co., Graselli Chemical Dept., Cleveland, Ohio, subject "Current Density Range Characteristics—Their Measurement and Application"; (4) Dr. C. B. F. Young of The Institute of Electrochemistry and Metallurgy, New York, N. Y., subject "A Curriculum for the Practical Electroplater"; (5) Dr. A. Kenneth Graham of A. Kenneth Graham & Associates, Jenkintown, Pa., subject "Studies of Electrolyte Films."

Mr. Oldam next presented our guest speaker for the evening, Mr. A. P. Munning of Munning and Munning, Inc. His subject was "The Dynamics of Polishing." His talk dealt with many phases of polishing operations prior to plating. Mr. Munning illustrated on a blackboard just what a polishing wheel does to a piece of metal when pressed against the wheel. How the grain of abrasive affected the chip of metal taken off in the operation; how the arc affected the temperature of the metal at the point of contact and how the amount of metal taken off can be calculated by: (a) the diameter of the wheel, (b) the speed of the wheel, (c) the pressure applied, (d) the grain size of abrasive used, and (e) the speed of the metal passing the wheel. Mr. Munning's talk, which was very much out of the ordinary in a platers' meeting, proved very interesting. He held the attention of the members for over an hour and was given a rising vote of thanks by the forty-seven members who attended this meeting which adjourned at 11 P. M.

GEORGE WAGNER, *Secy.*

Rochester Branch held its regular monthly meeting on Friday night, February 16 at the Seneca Hotel. We had as our guest speaker, Mr. Ralph E. Pettit, research chemist for the Aluminum Corporation of America at New Kensington, Penna. His topic, "Alcoa Aluminum and its Finishes," was one of very great interest to everyone. The talk was interspersed with a movie depicting aluminum from mine to consumer and slides of finished products. There was also a large display of finished parts. He told of the various uses for aluminum and all the different methods for finishing. After the talk Mr. Pettit was bombarded with numerous questions all of which he answered very completely, after which he was given a rising vote of thanks.

This meeting brought to a close our present series of guest speakers and the chairman of our educational committee, Mr. John J. Desmond, is to be highly commended for the splendid group of speakers he obtained and made available to our membership and their friends for this season. Great work, John, we hope to have you working with us next season.

The Rochester Branch has one more

Divine
BUFFS
Divine quality shows in lowered buffing costs
Divine Brothers Company
62 Whitesboro St., UTICA, N. Y.
Quality Products Since 1892

big session this year which is our 20th Annual Educational Session and Dinner Dance. This important event is to be held at the Seneca Hotel on Saturday afternoon and evening, April 27. All members and their friends are cordially invited to attend. For this session Mr. Desmond has obtained the following speakers, all recognized authorities in their respective lines: Mr. Frank Henry, chemist of the Rochester Gas and Electric Corp.—his topic, "Water"; Mr. Raymond F. Yates, vice-president of Krome-Alume Inc.—topic, "Plating of Aluminum and its Alloys According to the Krome-Alume Process"; Dr. D. A. Cotton, chief chemist of Delco-Remy Division General Motors Corp. —topic, "Hard Chromium Plating of Dies and Gages."

These three speakers will more than repay you for your effort in coming to Rochester to attend this session.

JUDSON R. ELSTER, *Secy.*

Used Buffs for Sale

64-68—1⅛" arbor—20 ply

Full Disc - Loose - or Sewed

Thousands of every size

8"—8¢ each 9"—9¢ each

10"—12¢ each

MICHIGAN BUFF CO., INC.

4054 Beaufait Ave. Detroit, Mich.

Wing Your Way to Dayton the Birthplace of Aviation

Los Angeles Branch of the A.E.S. held their regular monthly meeting February 14, at the Rosslyn Hotel in downtown Los Angeles.

President Ray Bray called the meeting to order at 8 P. M., and introduced the guest speaker of the evening, Dr. T. K. Cleveland of the Philadelphia Quartz Co. Dr. Cleveland's discussion was "The Principles of Detergency," a fine and up-to-the-minute topic that was appreciated by all.

Mr. Frank Rushton, Pacific Coast representative for the Sangamo Amperehour Meter, arrived with the latest type meter and described in detail its merits and uses.

The application of Mr. Rock J. Chartrand of the L. H. Butcher Co. of Los Angeles was read and Mr. William A. Schuler of NaMac Products Co. was elected as an active member. Meeting adjourned at 11 P. M.

RAYMOND SOLIVAN, *Secy.-Treas.*

Cleveland Branch held its regular meeting Saturday evening, March 2, in Parlor 34, Hotel Cleveland. The evening was raw with plenty of rain but a good crowd turned out.

The following applications were read and referred to the Board of Managers: For active membership, Mr. F. B. Henry of the Superior Plating Co., Youngstown, Ohio. For associate membership, Mr. S. J. Henry of the Superior Plating Co. and Mr. Nathan Hartman of the Grabler Mfg. Co., Cleveland, Ohio. The following were elected: As active member, Mr. Lester Lynch of the F. A. Reynolds Co., Cleveland. As associate members, Mr. F. J. Hill of the White Sewing Machine Corp., Cleveland, and Mr. R. R. Kirkpatrick of the

National Screw and Mfg. Co., Cleveland.

Chairman Singler of the entertainment committee suggested that it was about time the Branch threw another party. This idea received such strong support among the members present that it was decided to hold such an affair early in May. Mr. Singler promised to have all the plans made and the tickets on hand for the April meeting.

A fine letter was read from Mr. Svenson, chairman of our Membership Committee, to Mr. Sievering giving him the information he had requested regarding our activities toward getting new members. Letters were read from Mr. Smith of Dayton Branch and from Mr. J. L. Downes urging Cleveland Branch to exhibit again this year at the National Convention. Mr. J. L. Singler was appointed to look after this.

Librarian Hull introduced Mr. John Honnecker of the Frederick Gumm Chemical Co. as the speaker of the evening. His subject was "Streamlining the Plating Industry." It was the first appearance of Mr. Honnecker before the Cleveland Branch and a sense of pride prevailed among us to see that one of our own members could deliver such a fine address. Mr. Honnecker covered very fully the newer ideas that have come to the industry and illustrated each with a fine array of samples. He pointed out that for the most part these ideas were simple in themselves but it had taken the combined talents of practical and technical men to develop them. A question period followed the address and Mr. Honnecker received the applause of the Branch at its close. The meeting adjourned at 9:20 P. M. but a truckload of refreshments arrived and with Mr. Morrow at the piano, quite a period of song and story was enjoyed by all the members.

P. R. LYONS, *Secy.*

pH PAPERS

FOR DETERMINING pH VALUES OF SOLUTIONS

ACCURATE RESULTS IN FEW SECONDS

Just dip strip of pH paper in solution and read off pH value. Can be carried in pocket. Always handy.

AVAILABLE RANGES

Acid:	*Alkaline:*
pH 5.2—6.7 (nickel)	pH 6.6— 8.1
3.6—5.0 (nickel)	8.2— 9.7
3.7—5.3 (zinc)	9.2—11.0
1.9—3.4 (copper, nickel)	(brass, copper, silver)
0.9—1.5 (copper, etc.)	11.0—13.5 (Cadmium, zinc, tin and cleaners)

Each Range is Separately Boxed.

PAUL FRANK

456 Fourth Avenue New York City

Canada: Jaquays; Starke & Co., Montreal

Milwaukee Branch held its 306th regular meeting in the Colonial Room of the Republican Hotel on Friday, March 1.

The Exhibits Committee of the Dayton Convention are hot after exhibits for the Convention, and the librarian takes this opportunity to remind the members of Milwaukee Branch that it is not a bit too early to be getting your exhibit ready. Get in touch with Henry Bornitzke, 2602 North 50th Street, Milwaukee, and he will give you all the particulars in regard to the panel upon which the exhibit is to be mounted, and full shipping instructions.

The Banquet Committee reports that all is well, and plans shaping up nicely for our Annual Educational Session and

Banquet at the Hotel Schroeder on April 6th.

Our regular April meeting will be held on April 5, the first Friday in the month, at the Republican Hotel, and the meeting will start *promptly* at *seven-thirty*. This is necessary, as there will be election of officers for the ensuing year, and Mr. Harold Faint will be here to address the Branch on "Slow Speed Polishing."

You are especially urged to attend the April meeting as the success of the Branch depends on wise selection of its officers, and you should not leave that selection in the hands of only a few of the members, and then later accuse the Branch of being run by a clique.

DEXTER F. RHODES, *Secy.-Treas.*

Wing Your Way to Dayton
The Birthplace of Aviation

St. Louis Branch held its regular meeting at the Central Y.M.C.A. Dinner was served to twenty-eight members.

A letter was read from Joe Downes asking branches to lend their aid in maintaining the standard set last year at the convention, in regard to exhibits. Also one from L. G. Smith of Troy, Ohio. Letter was read in regards to membership drive and also questions to be answered from Nelson Sievering. Mr. Williams appointed John Vogt and H. Sturckhoff to take care of exhibits.

The Branch felt honored by the presence of their distinguished visitor Mr. Wilfred S. McKeon, President of Sulphur Products Co. of Greenburg, Pa. who spoke in some detail on the advantage of membership in A.E.S., especially to new members. He stressed the value to be received by attendance at the convention of the Society which is to be held in Dayton, Ohio, June 10-13.

Mr. McKeon is known as an authority on oxidizing. However he gave us some enlightenment on copper stripping and on avoiding buffing after chrome plating. Thanks, Mac. Hope you stop again when passing through.

Mr. Humbrecht then asked if there were any questions. One was asked on plating small nipples, which at times plate only on one side on bright zinc. The answer was—break connection and then start plating again. Mr. Humbrecht then told of some research he was doing on bright Ni and would tell us more later. Meeting adjourned.

C. T. MCGINLEY, *Secy.*

MAGNUS PRODUCTS
Tested and Proven for the Plater's Needs in
PRE-CLEANING
CLEANING
POLISHING
FINISHING
MAGNUS CHEMICAL COMPANY
41 South Avenue Garwood, N. J.

Magnus CLEANERS

Philadelphia Branch meeting was called to order by George Gehling in the absence of President Underwood, because of death in his family.

Mr. Al. Hirsch was introduced as the speaker of the evening, his subject, "The Atomic Theory." The paper was appreciated by all present. A rising vote of thanks was given him. Dr. E. B. Sanigar was called upon and expressed his pleasure at being present at our meetings. He gave a very interesting and educational talk on the Periodical Chart on display in Harrison Laboratory and expressed a willing desire to be present as he is free on Friday evenings. It was moved and seconded that Dr. Sanigar be given a rising vote of thanks.

Application of Mr. N. H. Vaneman as active member referred to the Board of Managers. Applications of Messrs. C. K. Goss, H. A. Guiger, W. W. Hall were reported favorably. It was regularly voted to elect them to membership.

A communication from Dayton Branch was read, motion that it be read at our next meeting was carried. Letters received from Vice-President Downes and Vice-President Sievering were read. Voted to grant requests. The Branch was informed that Nat. Verrelle is in the hospital. The secretary was asked to visit Mr. Verrelle.

Mr. L. A. Critchfield of Lancaster Branch informed the members that Lancaster Branch is going strong and invited all who can, to attend their meetings. Dr. H. Lukens of Harrison Laboratory, University of Pennsylvania, will be the speaker at our next meeting with a topic of interest to all. It will be illustrated. Communications from New York and Newark Branches regarding the combined annual dinner and Educational Sessions were read. A communication from Boston Branch was read. A motion was made that it be read at our next meeting. There being no further business, the meeting adjourned until March 22, 1940 at 8.00 P. M.

ROBERT E. JACKSON JR., *Secy-Treas.*

New York Branch held its monthly educational meeting for February at its headquarters in the Conference Rooms of the Hotel Pennsylvania on Friday, February 9. On this occasion the speaker was Mr. Thomas Chamberlain, supervisor of Metal Finishing at the

Chase Brass & Copper Co. of Waterbury, Conn. Mr. Chamberlain spoke on the subject of "The Finishing of Copper and Copper Alloys," beginning with the stamping and spinning through to the polishing and plating operations. Tom's talk was an exceptionally interesting one, thoroughly and frankly given, with an ease of manner and expression that found a ready response and interest from the fifty-seven members present. He covered many of the problems encountered in the alkaline and acid cleaning, polishing and buffing nickel, silver and chromium plating of brass, bronze and copper articles and at the conclusion of his talk answered a bevy of questions relative to his subject from a decidedly interested gathering. Tom was extended a rising vote of appreciation for his effort of the evening. We hope to have him with us on future occasions. He does a real good job.

Every need of the Plater
And Metal Finisher
Met promptly
And with
Personal interest

Test us

A. T. Wagner Co.

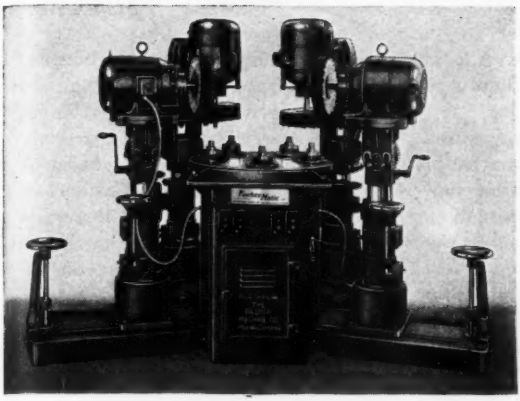
2700 Wight St. Detroit

Fitzroy 3171

On Friday, March 8, the Branch librarian, Dr. C. B. F. Young, presented as the speaker of the evening Dr. Colin G. Fink of Columbia University. Dr. Fink prepared and read a paper on the early history of electroplating and its progress up to the present day. He visualized prophesied changes that would take place in the industry in the not too distant future, noting among other things the rapid progress of plating strip stock and its fabrication after plating into products now made and finished separately, eliminating wiring and racking and the mass handling of single pieces in plating and finishing operations. Dr. Fink's paper and talk was very interesting but not altogether conclusive as was evidenced by the many pertinent questions from the membership as to the practicality of this procedure and what would be done to overcome raw edgings after stamping and what substitutions for soldering and forming in subsequent operations would be made. Dr. Fink answered some of the queries but stated he did not know as yet how all of the difficulties would be overcome. However, his talk aroused a keen interest and at its conclusion Dr. Fink was given a rising vote of thanks by his audience. There were two elections to membership and two applications filed at these meetings.

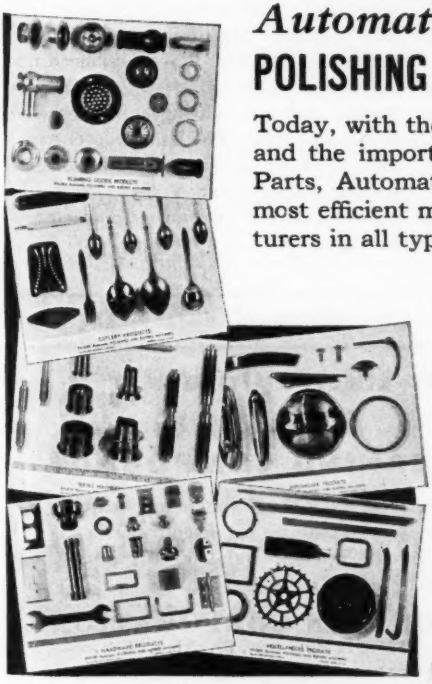
On Saturday, March 30th, the Newark and New York Branches will hold their second annual joint Educational Session at the Hotel Douglas, Broad and Hill Streets, Newark, N. J., at 3.00 P. M., to be followed by dancing, entertainment and a buffet supper in the evening. We extend a cordial invitation to all the metal finishing fraternity who have the opportunity to join us on this occasion.

F. J. MacStoker, *Secy.*



Volume Finishing at a Saving....

with.. **Packer-Matic**



Automatic POLISHING AND BUFFING MACHINES

Today, with the constant demand on Production and the importance of Finish on Products and Parts, Automatic Polishing and Buffing is the most efficient method used by leading manufacturers in all types of industries.

PACKER-MATIC Polishes and Buffs Parts of various sizes and shapes with equal efficiency, and Automatically. PACKER-MATIC is made in Rotary, Straight Line Conveyor and Roll types. No. 4 Rotary shown above.

Actual "Time Study" on your Part gladly given—Write Eng. Dept. and send Part.

THE PACKER MACHINE CO.
MERIDEN, CONN., U. S. A.

Cincinnati Branch of the A.E.S., met at the Hotel Metropole, February 29, at 8.00 P. M.

Mr. Joseph Adler was appointed chairman of the exhibits committee of the Cincinnati Branch, the exhibit committee to take care of the exhibits to be entered by the Cincinnati Branch at the Dayton Convention.

Four applications for membership were voted to be referred to the Board of Managers.

The rest of the evening was given over to Mr. Benner, of the du Pont Company, who gave a very interesting talk on Moly-Black. Mr. Benner gave to each one attending a souvenir ash tray from the du Pont Company. After the talk there were plenty of questions asked with Mr. Benner supplying the answers. The meeting adjourned at 10.30 P. M.

A special meeting was held in the grill room of the Cincinnati Club, February 22nd, 1940, for the purpose of hearing Mr. Leroy Beaver speak on the subject of Barrel Finishing of Metal Products.

Some of the subjects included were proper barrel speed, cleaning, burnishing, orange peel, water softening, and the care of burnishing materials. An interesting display of these materials, for metals and plastics were shown.

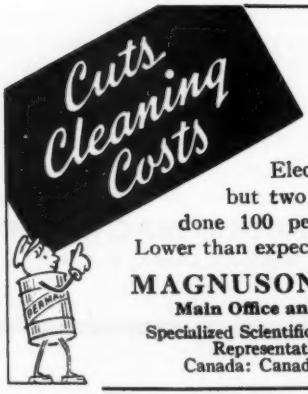
The Cincinnati Branch considers itself lucky to have had Mr. Beaver, a nationally known authority on barrel finishing, lecture to them at one of their meetings.

MARTIN GANNON, JR., *Secy.*

Wing Your Way to Dayton
The Birthplace of Aviation

Buffalo Branch held its regular monthly meeting at the Bailey Bowling Academy on Friday, March 8, with President J. Ruff in the chair.

In the absence of Mr. Mesle, our scheduled guest speaker, the program was capably filled, jointly by Dr. Wernlund and Mr. Ward Hill both of du Pont. Their subject was on safety devices and fire fighting equipment in modern plants. The talk was clearly illustrated by moving pictures. The speakers were given a rising vote of thanks and the meeting adjourned at 10 o'clock.



-for **Electroplaters**

PERMAG

CLEANING COMPOUNDS

Electroplaters use PERMAG for many reasons, but two of them are—Cleaning for Electroplating is done 100 per cent by PERMAG, and the cost is low. Lower than expected! Write us for more details.

MAGNUSON PRODUCTS CORPORATION

Main Office and Factory, Third & Hoyt Sts., Brooklyn, N. Y.

Specialized Scientific Cleaning Compounds for the Electroplating Industry.
Representatives, also Warehouses in Principal Cities, U. S.
Canada: Canadian PERMAG Products Ltd., Montreal, Toronto.

• *Available in most colors, including white, pastels, and clear.*

. . cover effectively the surface defects of rough metal castings in one coat.

. . no need for priming, sanding, removal of welding and tool marks, or other surface preparations.

. . beautiful, economical, durable.

. . various patterns, from coarse to fine.

. . one hour or shorter bake, at low or medium heat.

. . light in body, easily sprayed.

. . easily touched up and patched.

. . good coverage.

Send for full information

Maas and Waldstein Co. Newark N.J.

Branch Offices and Warehouses . . . 1658 Carroll Ave., Chicago . . . 1228 W. Pico Blvd., Los Angeles

LACQUERS **PIONEERS IN PROTECTION** ENAMELS

In the interval before the serving of refreshments, President Joe Ruff suggested that it would be an appropriate time for any stories or gossip which would provide entertainment for the company. This brought out totally unexpected results. Almost everyone contributed to this pleasant pastime but the outstanding raconteurs were Messrs. Post, Trembicki and Dr. Wernlund. Mr. Trembicki has an air of respectability that is a complete contradiction to the stories he told. From his appearance one could easily have imagined him conducting a choir practice rather than regaling an appreciative platers' audience. In the evident enjoyment of the stories we were obviously a group of kindred spirits.

Refreshments were served a little later concluding a very enjoyable evening.

RODERICK MCGHEE, *Secy.*

Wing Your Way to Dayton
the Birthplace of Aviation

Boston Branch met Thursday, March 7 at the Manger Hotel, Boston, at 8 P. M. with President DeLorme in the chair. Communications were received from seven branches expressing desire to back Boston in 1941, and they were placed on file.

This Branch will have an exhibit at the Dayton convention. The chairman of the committee will be Arthur J. Mintie. All members wishing to have an exhibit at Dayton should get in touch with him at an early date.

The Banquet Committee made a report that it will be one of the best ever held. A sight-seeing trip for the ladies has been planned this year and should be very interesting for those who wish to see the historic spots of greater Boston.

We had our friend Frank Clark with us and he gave a short talk on bright nickel and also on the pickling of stainless steel. He had with him some samples of bright nickel on steel which were very interesting and after the talk he answered all questions for the members. He was given a vote of thanks.

We also had Executive Secretary William Kennedy with us after his trip to the different branches and he told how they hoped that Boston would get the 1941 convention—some have already given Boston their support. He told of the work that has to be done in order to make a success of it and that the work should start now and keep up until it is over. Thanks to you, Bill, you're always welcome to Boston.

One of the questions asked was "At what temperature should cadmium plated work that has to be japanned be baked, without the cadmium going up the flue. This could not be answered so we are passing the question on to the other branches for an answer. Meeting adjourned at 11 P. M.

Tickets for the banquet can be had from A. W. Garrett, 100 King St., Dorchester, Mass.

A. W. GARRETT, *Secy.*

Any Plating Solution Analyzed for only One Dollar. 25% Off on all Reagent Solutions used for Analyzing Plating Solutions. For information write to—

PLATERS' LABORATORY SERVICE
1153 ST. GEORGE AVE. ROSELLE, NEW JERSEY

A NEW NICKEL STRIPPING PROCESS

(Patent applied for)

SAVES TIME

Saves up to 50 per cent in stripping time.

PROTECTS THE BASE METAL

Strips nickel from steel, brass and zinc die castings without pitting or roughening the base metal.

SAVES ACID

More dilute acid solutions can be used

SAVES MONEY

Reduces finishing costs.
Shortens stripping time.
Requires less acid.

Write for information and prices:

CHEMICAL CORPORATION

93 Broad Street **Springfield, Massachusetts**

NUGLU

SALES INCREASE -- 1939 over 1938

298%

Polishers are realizing more and more that there is a cold glue available that will work on all jobs and cut costs tremendously.

J. J. SIEFEN COMPANY

DETROIT

Springfield Branch held its regular meeting at Hotel Charles on February 26 at 8:00 P. M., President Costigan presiding.

In response to a letter from Mr. G. Louis Smith, chairman of the Exhibits Committee for the Dayton Branch, President Costigan appointed Messrs. Copp and Hutchins members of the Branch committee whose duty it will be to secure exhibits from this district for the national convention.

The following members were appointed to the nominating committee: Messrs Niles, Murray and Randall. They will submit their nominations at the next meeting.

Mr. Kennedy introduced Mr. Ellsworth Candee, chairman of the Regional Convention which will be held in Waterbury on April 27. Mr. Candee explained the progress which the committee has already made, and promised an enjoyable and profitable evening to all who attend.

Dr. Walter Meyer then gave an interesting talk on zinc plating. He covered so much territory in the three-quarters of an hour that your secretary was busy writing during the entire talk. Following are some of the interesting points which he brought out: Zinc requires 40% longer to plate than cadmium when both are plated at the same current densities. It will stand up 70% longer in Pittsburgh than cadmium but is inferior when exposed to marine atmosphere. Rosin flux cannot be used when soldering on zinc plated steel. Acid flux must be used but is not advisable when soldering electrical contacts. In Bethanizing, high speed zinc plating of wire, lead anodes are used in a bath of sulphuric acid and the zinc ore. He explained that bright zinc work bright dipped in a chromic-sulphuric acid solution will sometimes turn black when stored during the summer for any length of time. To prevent this condition he suggested a 1/2% sulphuric acid dip following the bright dip rinse. Zinc deposited on plating racks which support steel springs during the plating have caused hydrogen embrittlement because of the gas evolved during the interval the rack and springs are in the acid dip. This condition was corrected by stripping the racks each time before the springs were loaded. In addition Dr. Meyer also explained the advantages of the various bright dips, the composition of different zinc solutions, and the brighteners used in each.

The concluding feature on the program was an interesting and profitable demonstration of the Magna-Gage by Dr. Kellner and Mr. W. Starr of the Lea Manufacturing Co. They explained the operating principle of the instrument and ran thickness measurements on samples which members had brought in.

The speakers were given a rising vote of thanks for their help in making the meeting an enjoyable success.

D. S. HARTSHORN, JR., *Secy.*

Bridgeport Branch held its regular meeting March 7, in the Chamber of Commerce Rooms, Stratfield Hotel.

President Bill Ehrencrona reported the plans for the Regional Banquet were shaping nicely and good responses on program advertising were being received.

Chick Helmle, chairman of Convention Paper Committee, reported difficulty by the committee in selecting a desirable topic for the convention paper. A discussion was held by the members regarding various topics that might be suitable.

The secretary was instructed to reply to a letter from Mr. Nelson Sievering requesting data and information for his

Beauty of finish has always distinguished fine furniture. And modern furniture, such as Chromcraft dinette set illustrated, imposes even more exacting standards than is the case with traditional materials. With this fact uppermost in mind the American Fixture and Mfg. Co., of St. Louis, Mo., recently conducted tests with metal cleaners, adopting one of the Pennsalt Cleaners after it had demonstrated a clear superiority in actual service.

The results showed a 37.5% saving in cleaning materials over the cleaner formerly used, eliminated a sawdust cleaning operation, and a costly hand scrubbing operation as well. In producing these substantial savings, the Pennsalt Cleaner prepares the surface of the metal properly for the exacting chrome finishing operations.

Orthosil was the original Pennsalt Cleaner—a product that brought outstanding new economies and improved results to heavy-duty metal cleaning operations in virtually every industry. Companion cleaners, meeting each need with laboratory precision, have been developed for varied and extreme requirements. Together they form the group known today as the Pennsalt Cleaners.

Their exceptional dissolving and emulsifying action, tremendous lasting power, and quick efficient cleaning ability fit one or more of them for a money-saving place in your processes. Why not give them a test? Write to Dept. I and we will gladly furnish full details. Pennsalt Cleaner Division, Pennsylvania Salt Mfg. Co., Philadelphia.

PENNSALT
CLEANERS FOR INDUSTRY

PENNSYLVANIA SALT
MANUFACTURING COMPANY
Chemicals

Committee on Membership.

The Boston Branch's request for Bridgeport's support to hold the 1941 convention in Boston was approved. A motion was made and carried to instruct the Bridgeport delegates to the convention to vote in favor of Boston Branch. A letter from the Newark Branch regarding their Educational Session and Social March 30, was read. A letter from G. Lewis Smith of Dayton Branch regarding Branch exhibits was read and Clarence C. Helmle was appointed chairman of the Bridgeport Branch Exhibit Committee.

Anthony De Siena was elected an active member. The following were elected associate members: Frank J. Kalafus, Arthur R. McNeil, Milton T. Vreeland, Charles Auburn.

It was decided to hold an open meeting Friday, March 29.

A general discussion of plating problems followed and the meeting adjourned at 10:30.

EUGENE PHILLIPS, *Secy.*

Wing your way to Dayton
the Birthplace of Aviation

Waterbury Branch held its March meeting on Friday, March 8, at the Hotel Elton. Another good turnout was recorded with twenty-two members and friends attending the informal get-together dinner at 6:30 P. M. and forty-five attending the regular meeting at 8:00 P. M. The dinner has proved to be very popular in that it gives members a chance to visit with friends whom they sometimes do not see between meetings.

The regular meeting was opened by President Candee who then sought to name Dick Crane as technical chairman for the evening. A point of order was raised in regard to Dick's technical qualifications for this job but Dick defended himself masterfully, and was allowed to proceed with the introduction of the guest speaker of the evening, Mr. W. G. Sheane of the General Electric Co., who spoke on the testing and control of organic finishes. Mr. Sheane described the methods now being used for testing viscosity and covering power of paints and lacquers. Also methods of application and for determining the thickness of the dry film. He stressed the importance of not using any more material than was necessary to get the desired color. He also stressed the importance of correct baking temperature and time on baked finishes. Overbaking might cause cracking and peeling, similar to poor cleaning of the basic metal.

Mr. Sheane answered many questions on this important companion and competitor to electroplated finishes, and received a warm vote of thanks from those present.

Mr. Candee appointed the following men to act as a nominating committee for the officers for the coming year; William Gray, George Dubpernell and George Muscio.

The following committee was appointed to look after the Branch exhibit for the national convention at Dayton this year: Dick Crane, Louis Lougee and Wesley Cassell.

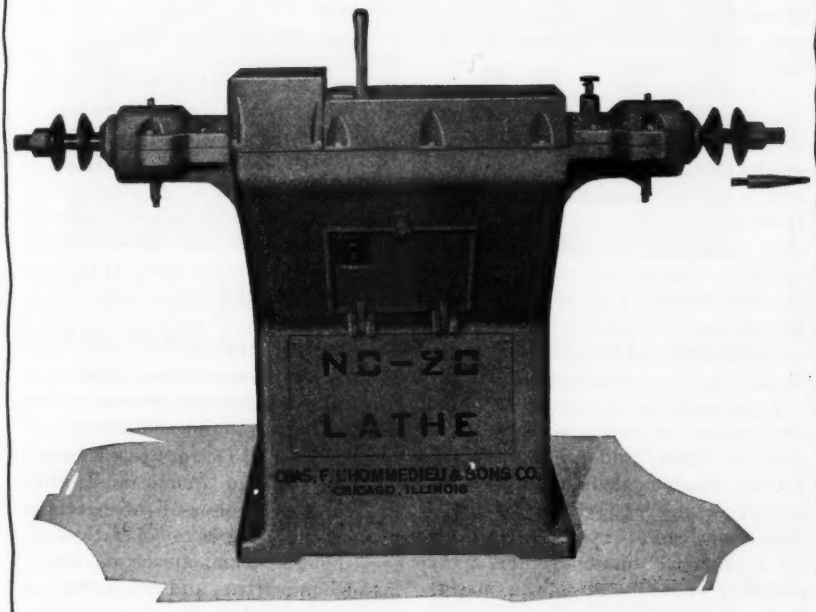
Dr. Dubpernell received the third edition (just recently published) of "Theoretical and Applied Electrochemistry" by M. D. Thompson. He said this book thoroughly covered the principles underlying the process of electroplating.

The meeting adjourned about 11:00 P. M.

GEORGE MUSCIO, *Secy.*

Montreal Branch of the A.E.S. held its regular meeting on Thursday, February the ninth, at 8.00, in the New Carlton Hotel, President Charles

Variable Speed Lathes Lower Your Buffing Costs



ANY SPEED FROM 1800 to 3000 R. P. M. INSTANTLY.
ALL TYPES AND SIZES.
WRITE FOR PARTICULARS.

Chas. F. L'Hommedieu & Sons Co.

MANUFACTURERS

Gen. Office and Factory:
4521 Ogden Ave.
Chicago
Dealers in Principal Cities

Branches:
Cleveland, Los Angeles
Wm. R. Shields,
Detroit

COMPLETE PLATING PLANTS INSTALLED

Doherty in the chair, presiding.

It was gratifying to see attending many absentees of past meetings; along with the ever-present stalwarts these prodigals swelled the roll call to a near record.

The application of Mr. Joseph Miraglia as active member was received and approved for endorsement by board of managers.

A letter from Mr. Ewart B. Creighton, applying for transfer of membership to Toronto Branch where he now resides, was read and approved, his friends here wishing him every success. Good sledding, Ewart! The membership committee reports interviewing several prospects expected to enroll in the near future. A letter from Boston Branch was also read and discussed to no conclusive decision and the question filed for further consideration.

A discussion on general plating held the interest of everyone, with Hon. John H. Feeley and Librarian H. S. Jordan supplying helpful information on several subjects discussed. Mr. J. T. Reisenburg can always be counted on for a practical solution to the many problems encountered in the plating department and no less can be said for Mr. H. Harding who specializes in chrome and bright nickel plating of valves and plumbing fixtures.

It was agreed that an occasional ad lib of this nature appeals to the plater—where anyone may, and does, bring forward his favorite method of application to some pet plating bath.

A. W. JEROME, *Secy.*

Toledo Branch of the A.E.S. met on Thursday, March the seventh, at the Macomber Vocational High School.

Mr. Shank, chairman of the Exhibits Committee, reported that he had five members who promised to contribute plated ware for the exhibit, he also requested that all material for the exhibit be ready and in his possession no later than the May meeting.

A motion by Mr. May that the panels that are to be plated in connection with a Branch paper for the convention be polished by the Gerity-Whitaker Co. of Toledo at cost, and without any overhead cost, and according to specifications of the Toledo Branch, was seconded by Mr. Stanly Moore and passed by the assembly.

At this time the chair introduced the speaker of the evening, Mr. Klass of Divine Brothers Co., who talked on machine finishing (automatic polishing and buffing), he also showed slides, with pictures of many different types of machines available today, pointing out the advantages of each as compared with some of the earlier types. Mr. Klass answered questions pertaining to the subject matter at the end of his talk, to the satisfaction of all concerned.

Mr. Wilson of Detroit, past supreme president of the American Electroplaters' Society, showed three reels of movies, consisting of the operations involved in the manufacturing and finishing of bumper bars and coil springs at the Chevrolet bumper plant. These were very interesting as every operation was done on automatic machinery, and the pictures showed every operation in detail and were in colors. Mr. Wilson explained each operation as the work progressed from one machine to the other, he also answered many questions asked him from interested parties. Mr. Klass and Mr. Wilson were given a vote of thanks at the close of the meeting. Members of the Branch had a very pleasant surprise in the presence of Mr. W. W. McCord, associate editor of THE MONTHLY REVIEW, during the meeting. The Toledo Branch wishes to thank Mr. McCord for a pleasant association during his short stay, and hopes that he

Compounds in cake or paste form for all kinds of high carbon, rustless and stainless steel.
4A Cement, a substitute for glue to make-up wheels, rolls, belts, buffs, etc.

HARRISON & COMPANY HAVERHILL, MASS.

Buffers and Polishers find Type "A" Bias Buffs
—low in cost
—fast in work
—high in efficiency.

Get a trial order.

—Note the overlap ply on the face of this buff.

This gives it double polishing surface.

5 sections of this buff equal 10 sections of the ordinary buff.

That looks like economy!

The BIAS BUFF & WHEEL CO., Inc.

438 Communipaw Ave. Jersey City, N. J.

will come back and see us in the very near future. The meeting was adjourned at 10:45 P. M.

A special meeting of the Toledo Branch of the A.E.S. was held on Wednesday February 28, at the Macomber High School, for the purpose of having Mr. LeRoy Beaver talk before the branch on barrel finishing.

The meeting was called to order by the president, Mr. Miner, at 8:20 P. M. There were twenty-five members and about five visitors present.

Mr. Mitchell, chairman of the membership committee, gave a favorable report on the work of his committee.

Mr. Ward Hunlock reported on the progress of his committee and said that he had already notified the Dayton branch that Toledo would have a paper ready for the convention.

Favorable action was taken on a letter from the Dayton Branch concerning exhibits for the convention, Mr. Shank, committee chairman and Mr. DiSalle assuring the Branch that there would be an exhibit from Toledo. Several of the members showed their willingness to cooperate with this committee by offering to contribute plated articles.

At this time the applications of Mr. Gordon St. Clair Deye, and Mr. David Williamson were read and accepted.

The meeting was then turned over to the educational chairman, Mr. May, who introduced the speaker of the evening. Mr. LeRoy Beaver spoke on a very interesting topic, barrel finishing, The keen interest that he created among those present was shown by the many interesting and practical questions that were asked him pertaining to the subject. At the close of the meeting Mr. Beaver was given a vote of thanks. The meeting adjourned at 10.30 P. M.

GASTON BERGEMAN, *Secy.*

Wing your way to Dayton
the Birthplace of Aviation

Chicago Branch met on March 9, President J. W. Hanlon presiding and all other officers present. Mr. H. A. George was elected to membership.

The meeting was turned over to Librarian O. Weickmann who introduced Mr. H. L. Beaver and his subject "Barrel Finishing." Mr. Beaver was given a rising vote of thanks for his fine talk and gave us the answers to many questions.

The following questions were in the Question Box.

Q. Will a solution composed of 16 oz./gal of cyanide, 2.75 oz./gal of cadmium as metal, 1.75 oz./gal of caustic soda produce a good deposit in a barrel?

A. It should if the impurities are not too high.

Q. Does ammonium chloride tend to increase the carbonates in a brass solution?

A. No.

M. H. LONGFIELD, *Secy.-Treas*

Every BUFF Made to Your Order
Deliveries on Schedule
MIDWEST BUFFS
USE MIDWEST
E. 79th ST. & PLATT AVE. CLEVELAND OHIO